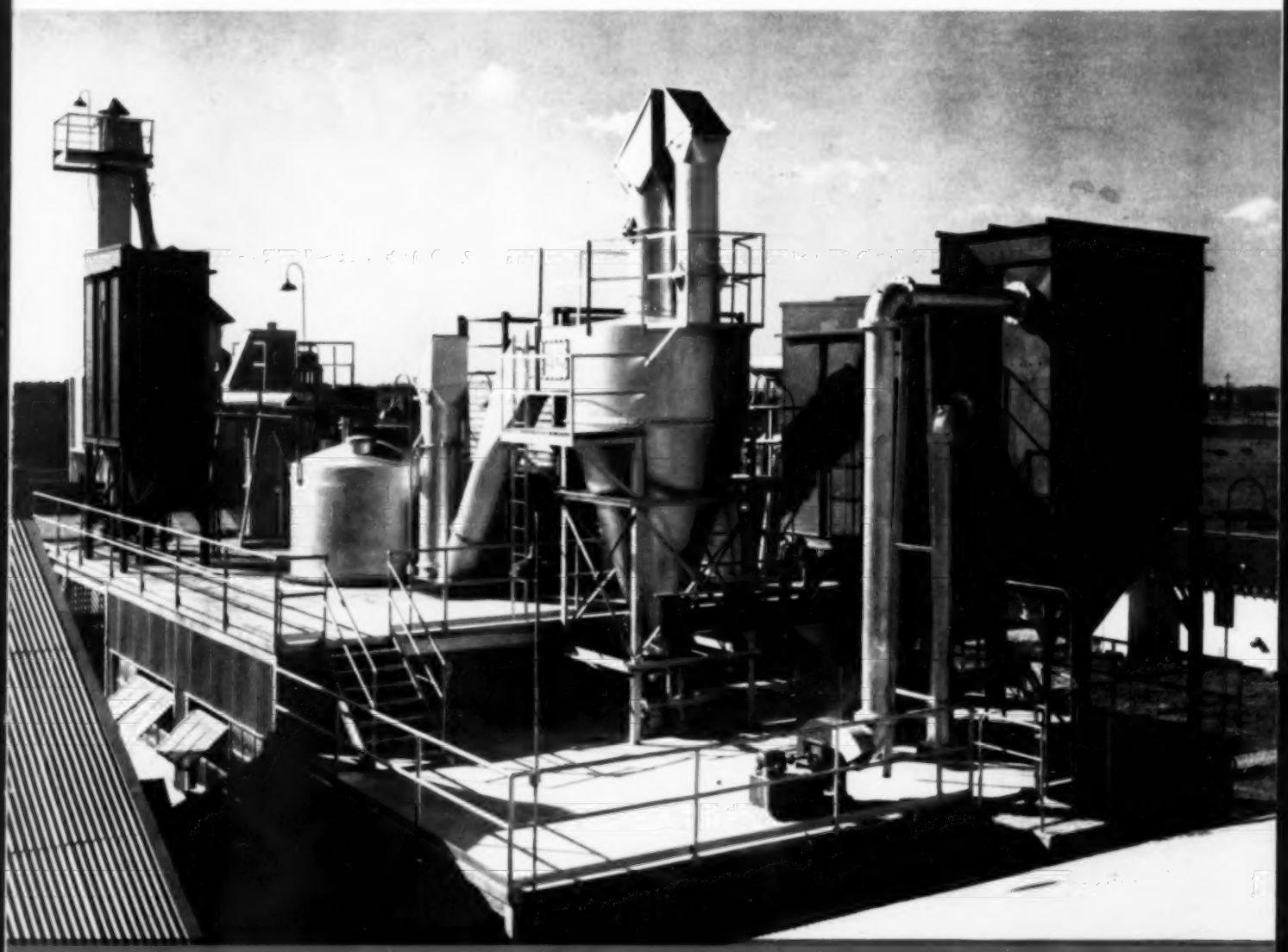
Vol. 9, No. 7 JULY, 1954

AGRICULTURAL CHEMICALS



In This Issue:

Entomological Aspects of Systemics • APFC Meeting Report
100 Years for Entomology • Malathion • NFA Meets in W. Va.

CONGRATULATIONS

To all members of the industry who contributed to the success of the annual fertilizer conventions!

The active participation of leaders in Congress, government, and business is a tribute to the essentiality of the industry and its vital role in fostering continued progress in agriculture.

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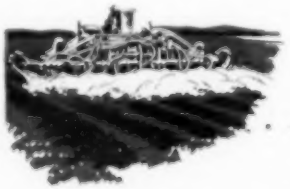

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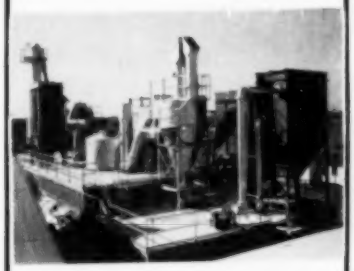

This Month's Cover

Insecticide concentrate plant of the Stauffer Chemical Co., in Houston, Texas, which went into operation in 1951. A modern chemical control laboratory is included in the plant, which has a commercial production of numerous Stauffer products.

JULY 1954
Vol. 9 No. 7

A Monthly Magazine For the Trade

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AGRICULTURAL CHEMICALS

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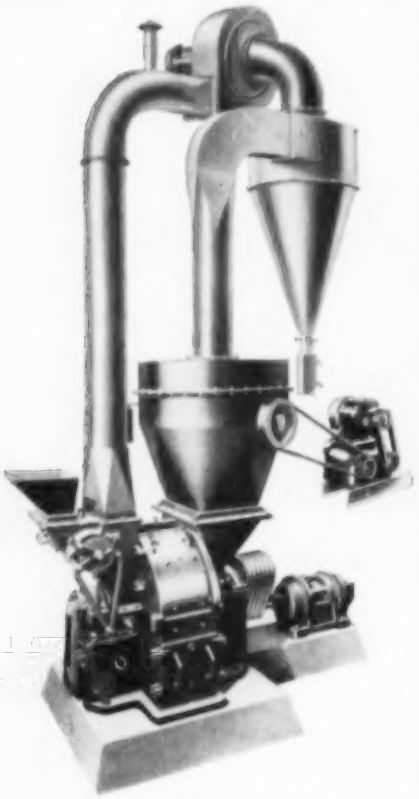

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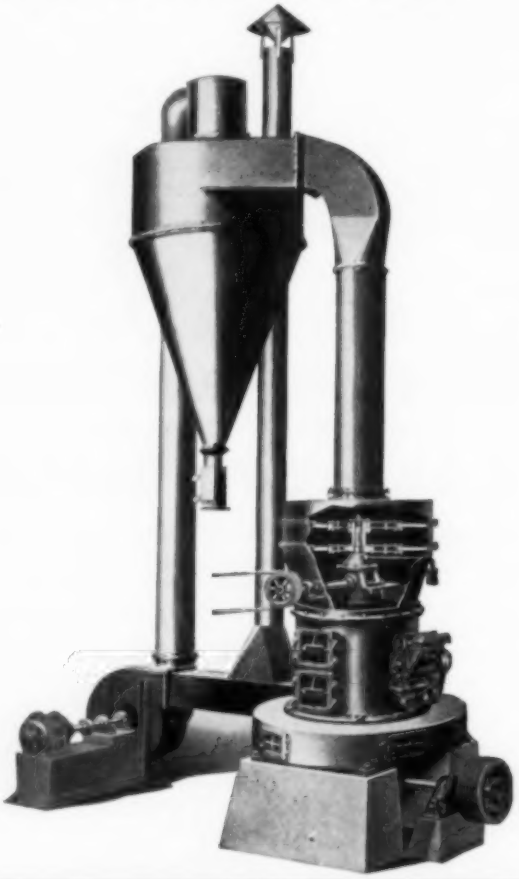

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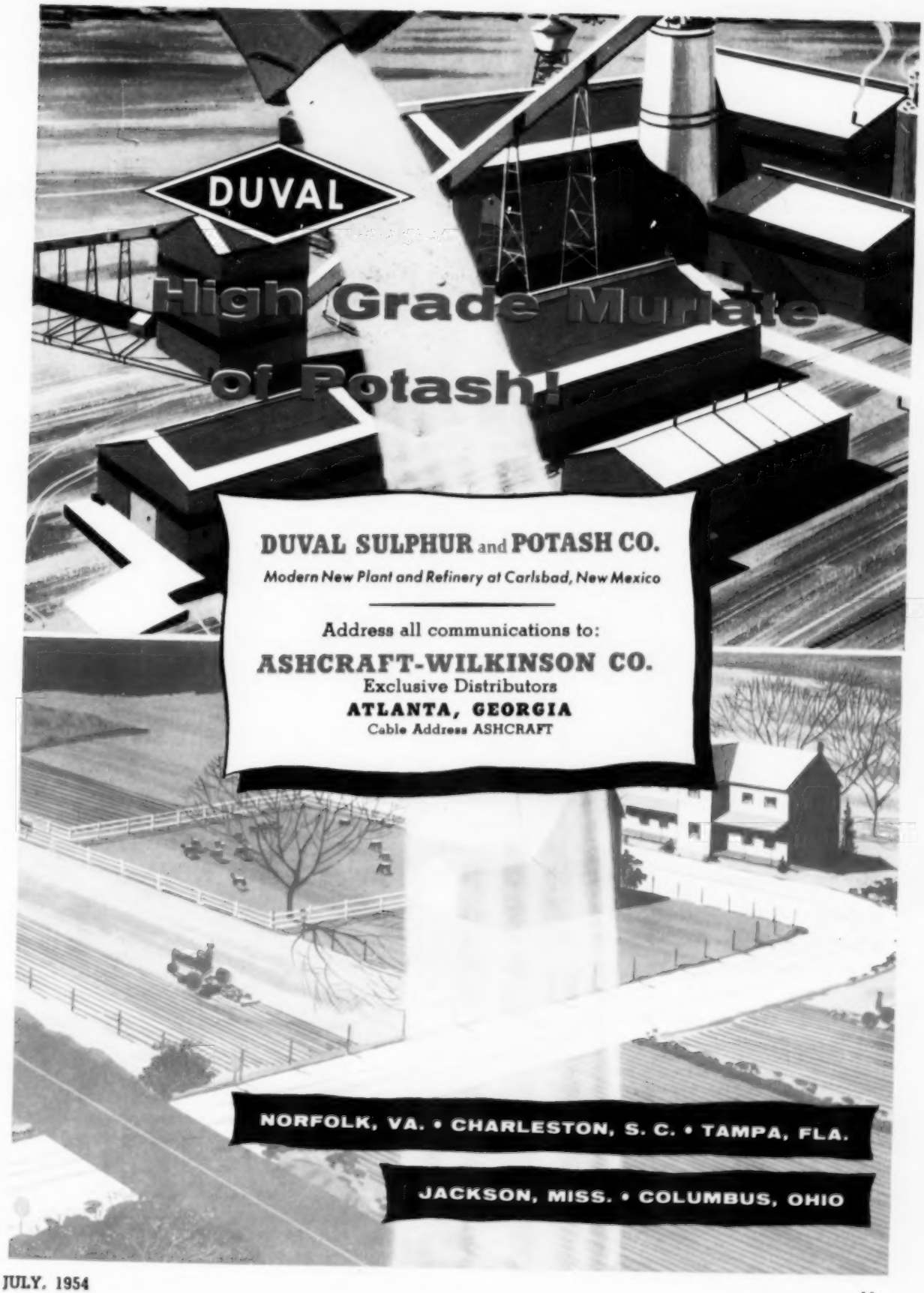
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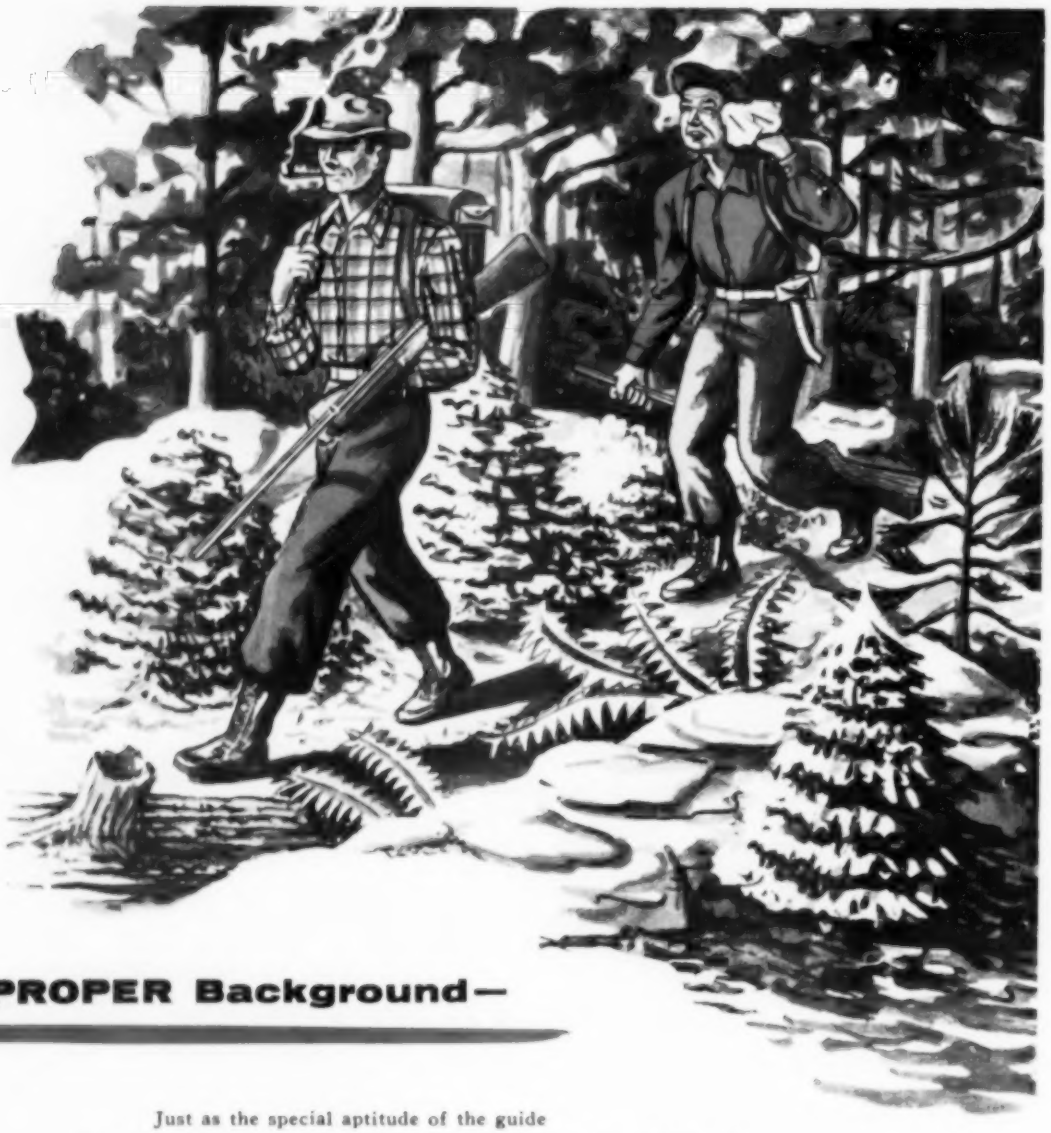

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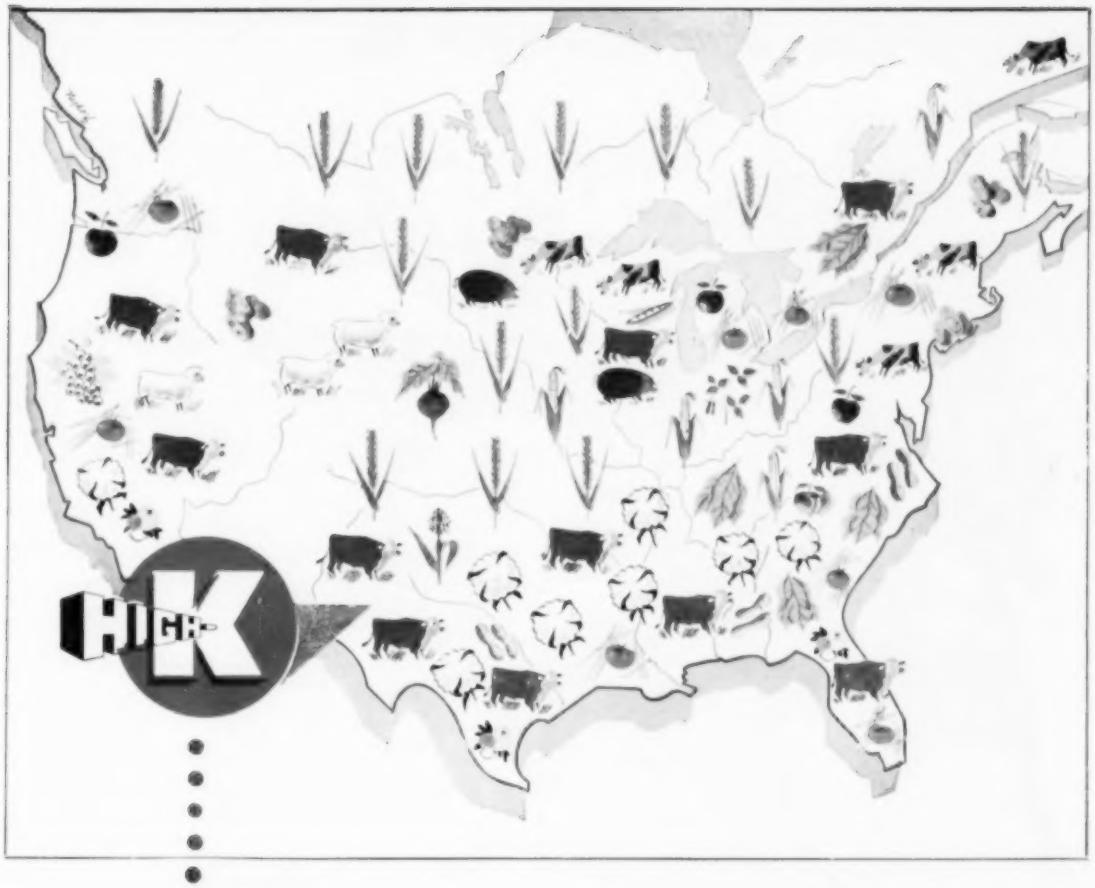

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CHEMICALS

Meeting Calendar

July 20-22—Pac. Northwest Regional Fert. Conf. Klamath Falls, Ore.

July 22-23 — Southwest Fertilizer Conference. Buckaneer Hotel. Galveston, Tex.

July 29-30—Eighth Annual Beltwide Cotton Mechanization Conference. Little Rock, Ark.

Aug. 10-12 — Ohio Pesticide Institute summer tour, starting at Wooster, Ohio

Aug. 11 — Annual Kentucky Fertilizer Conference. Guignol Theater, Univ. of Kentucky, Lexington.

August 25-27 — American Phytopathological Society, 46th Annual Meeting, Estes Park, Colo.

Sept. 6 — National Joint Committee on Fertilizer Application and American Society for Horticultural Science, University of Florida, Gainesville.

Sept. 8-10 — National Agricultural Chemicals Association, Spring Lake, N. J.

Oct. 6-7—Fifth Annual Convention. Pacific Northwest Plant Food Association, Sun Valley, Ida.

Oct. 11-13 — Association of Official Agricultural Chemists, Inc., Shoreham Hotel, Washington, D. C.

Oct. 13-14—Association of American Fertilizer Control Officials, Shoreham, Washington, D. C.

Oct. 16 — Association of Economic Poison Control Officials, Shoreham Hotel, Washington, D. C.

Oct. 15—Association of American Fertilizer Control Officials, Shoreham Hotel, Washington, D. C.

Oct. 18-19—Fertilizer Section, NSC, Chicago, Ill.

Oct. 25-29 — American Society of Agronomy, Minneapolis, Minn.

Nov. 3-4—South Carolina Annual Fertilizer Meeting, Clemson College, Clemson, S.C.

Nov. 10-12—National Fertilizer Assoc., Hollywood Beach Hotel, Hollywood, Fla.

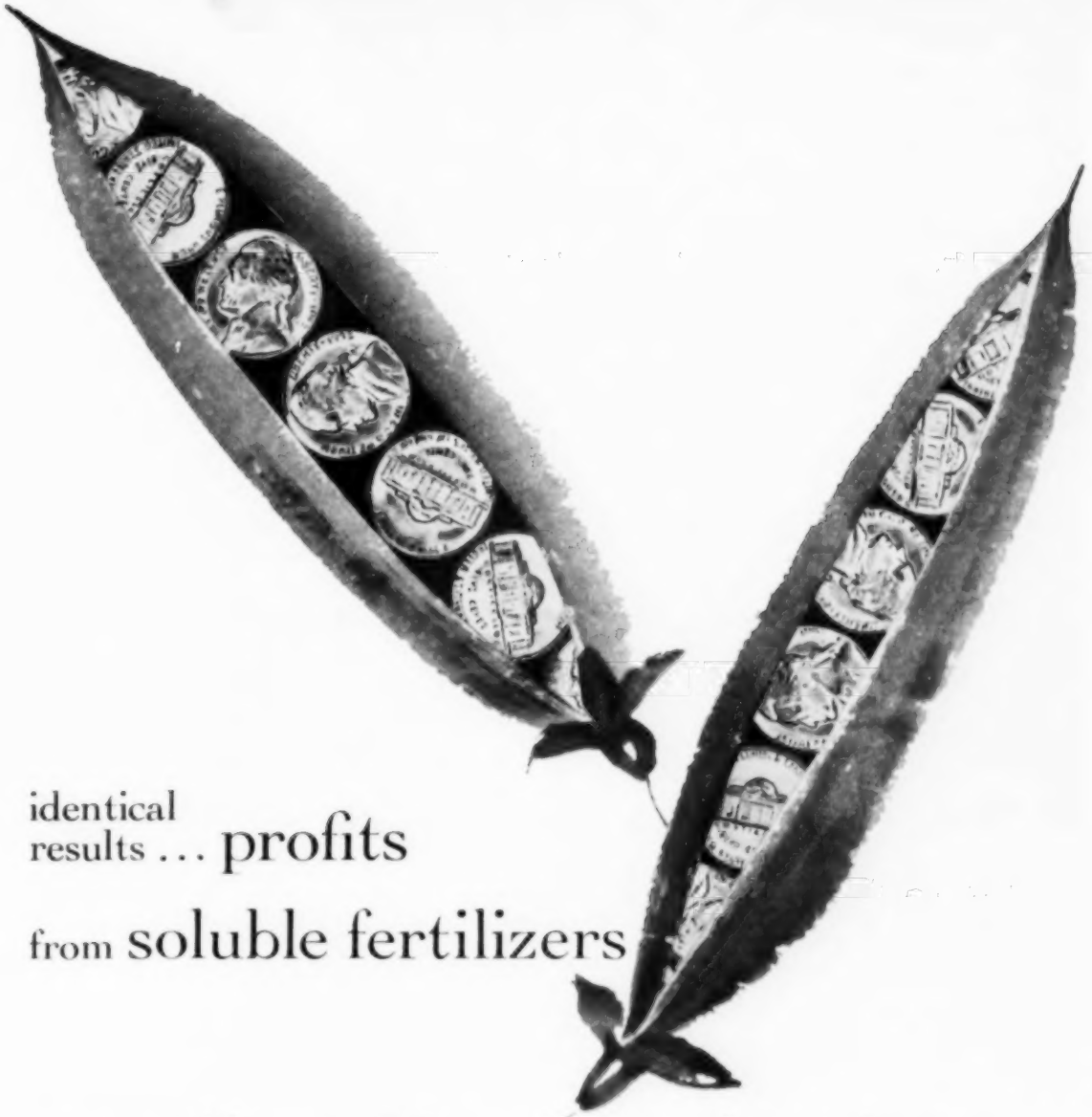
Nov. 15-16—Eastern Branch, E.S.A., Hotel New Yorker, New York City.

Nov. 15-16—California Fertilizer Association, del Coronado Hotel, Coronado, Cal.

Dec. 2-3 — Beltwide Cotton Insect Control Conference, Adolphus Hotel, Dallas, Tex.

Dec. 5-8—Agricultural Ammonia Institute, Jung Hotel, New Orleans.

Dec. 6-7—Entomological Society of America, annual meeting, Houston, Tex.



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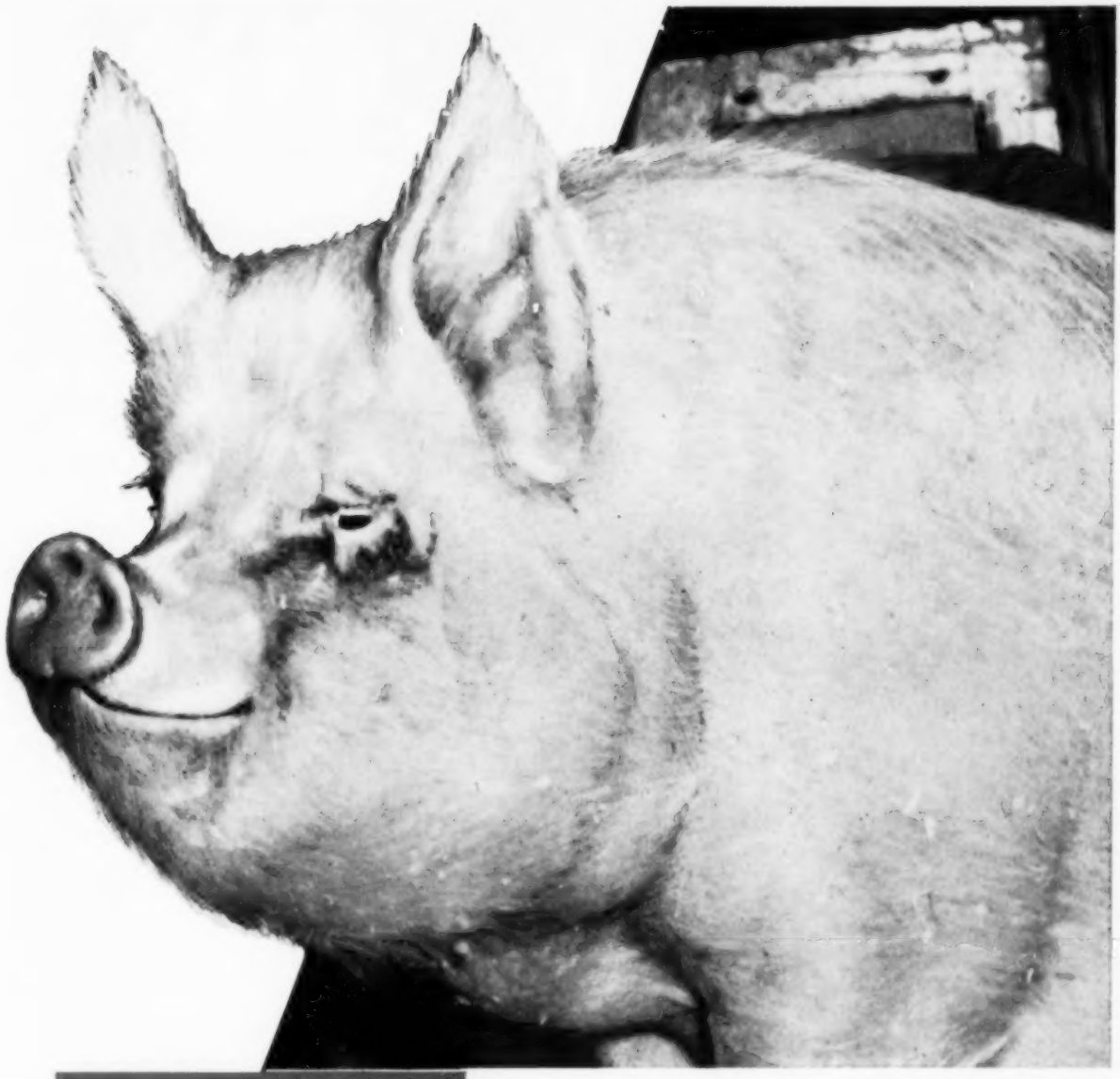

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Editorial
COMMENTS

RUMBLINGS late last month in Washington pointed to early passage by the Senate of the companion measure to the Miller bill, and the likely prospect that the measure might be enacted into law before Congress adjourns. As one participant in the Senate's public hearings pointed out, "everyone seems to be for the mea ure." It stands to benefit the grower, the food processor, the general public, the pesticide industry and agencies charged with enforcement of the law and protection of the public health.

The only opposition voiced to the Aiken Bill (S.2868) came from a few medical men whose testimony in the past has been strikingly unsupported by factual evidence, and sharply in conflict with the general weight of opinion of recognized medical and entomological authorities. There is always some fringe opposition to any measure, no matter how worth while and how widely supported, but reports from Washington seems to indicate that this particular opposition has already been discounted, and the Senate may be expected to act favorably on the bill in the very near future, perhaps even before this issue reaches its readers; Then only signature by the president will be required for the Miller-Aiken measures to become law.

When that occurs, as now seems very probable before Congressional adjournment, we would like to repeat once more what has been emphasized in these columns before, - early and often. Let's not expect too much from "law." Americans have long been prone to agree "there ought to be a law," push the desired law through to adoption, - then promptly forget the whole thing.

To our mind safe use of insecticides and other agricultural chemicals is much more a function of education than it is of law. Let's keep doing the educational job! Emphasize the imperative necessity of reading labels, following directions and using all the recommended safety precautions!

FERTILIZER sales have been setting new records for years, for about sixteen successive years as a matter of fact. But this past year the fertilizer industry established a record of another type, which to our minds is the most unusual record of the entire period. Fertilizer sales continued to gain in the 52-53 crop year *in spite of* a decline in farm income. This is really a remarkable record in the light of the historical pattern of the past which has always been that fertilizer sales move up or down with farm income.

It is probably too early to feel sure that the historical pattern may not reassert itself in time, should farm income continue to decline for any extended period. And it is certainly no time for fertilizer manufacturers to sit back on their laurels, or relax their sales efforts for a moment.

For it is intelligent selling, continued education of the farmer and the constant promotion job done so well by the fertilizer associations that has been responsible for this reversal of

(*Continued on Page* 107)

entomological aspects of systemic pesticides

By Harold T. Reynolds *

University of California, Citrus Experiment Station
Riverside, Calif.

SYSTEMIC insecticides, when applied to a plant, are absorbed and translocated through the sap stream, making other parts of the plant toxic to certain pests. This fact serves to illustrate that economic entomologists have a new approach to pest control, which may drastically change existing control methods and the degree of controls obtained, as well as widen the range of pests which can be brought under control. Perhaps we are on the threshold of a period such as DDT initiated in chlorinated hydrocarbon research in economic entomology and 2,4-D initiated in the study of plant harmones.

Absorption and Translocation

A DETAILED account of the intricacies involved in the absorption and translocation of systemic materials is not within the scope of this paper. However, a brief review of a few fundamentals may be helpful. Absorption may take place through the roots, by the aerial part of a plant, or by the seed.

1. Absorption by the root system. The first record of systemic activity through root absorption was published by Hurd-Karrer and Poos in 1936 who noted that aphids did not attack plants growing in soils containing selenium. As a result of this discovery, sodium selenate is used to some extent for mite and aphid control on some ornamentals, but is not effective enough on many pests and is considered too toxic for general use. In recent years, many workers have reported on the ability of other compounds, notably organic phosphorus compounds, to be absorbed by the roots. David (1951) on bean plants and Metcalf and March (1952) on citrus trees, reported quantitative data obtained with OMPA using radioactive tracer methods. Other workers have shown the ability of the roots to absorb many other materials, particularly Systox, Hanane and Isopestox. These and other investigators have shown that systemics absorbed by the roots are translocated to all parts of the plant.

2. Absorption by the aerial part of the plant. Practically all workers have shown that systemics are absorbed into the leaves. David (1951) found 69 per cent of the OMPA entered bean leaves in 14 hours and Metcalf and March (1952) found 50 per cent entered citrus leaves in 24-48 hours. Smith and Fulton (1950) indicated that newly expanded leaves absorbed systemics better than very young or old leaves. Lickerish (1951) pointed out that the plant surface must be sprayed as thoroughly as possible, since translocation from a treated to an untreated area on the plant was generally inadequate for good control. Other workers have substantiated this finding.

Translocation within the plant following spray applications to aerial portions may be widely variable with different systemic materials. During 1953, in southern California (Metcalf and Reynolds, 1953) Acala 4-42 cotton was sprayed with a 0.1 per cent P^{32}-tagged solution of 65-35 Systox and 0.1 per cent solution of $OMP^{32}A$. Fifteen days following application, leaf samples were taken from growth subsequent to treatment and examined for radioactivity. When those untreated leaves were compared to treated leaves, it was found that 2.3 per cent of the Systox and from 19 to 24 per cent of the OMPA was translocated into this new growth. In radiotracer studies on other crops in southern California, similar translocation data was obtained with Systox and OMPA sprays. On root crops such as carrots and sugar beets, it was found that relatively large amounts of OMPA were translocated into the large tap root but that Systox remained largely in the aerial portion of the plant.

Application to the bark of trees has been shown to be very effective for mite and aphid control by Jeppson, *et al.* (1952) and others. Met-

*Paper presented at Seventh Annual Cotton Insect Control Conference, Memphis, Tennessee, December, 1953.

calf and March (1952) indicated that application to the base of orange seedlings was much more efficient than water-culture applications. Jeppson (1953b) later found that trunk treatments were more efficient than soil treatments. This type of treatment has resulted primarily in translocation throughout the upper portions of the plant.

3. Absorption into seeds. Several workers, notably Ripper, *et al.* (1950), Ivy, *et. al.* (1950), and Reynolds, *et. al.* (1950a), have shown that systemics are absorbed into the seed in sufficient amounts to give some insecticidal effect by soaking or coating seeds with systemics.

Application

THE problems involved in obtaining adequate plant coverage for control of certain plant pests with conventional insecticides are greatly simplified by the use of systemic materials. On cotton, for example, it is difficult with conventional acaricides to obtain control of some mite species which inhabit the lower leaf surface. Reynolds, *et al.* (1953b) pointed out that aerial sprays of Systox at low gallonages were extremely effective for controlling mites on this crop and, thus, no special equipment or application techniques were necessary. Jeppson (1953a) stated that with conventional sprays on trees with dense foliage such as oranges, it is frequently necessary to apply up to 3000 gallons of spray per acre. This necessitates heavy equipment, which, when loaded, may weigh up to 12 tons, resulting not only in high costs but in injurious packing of some soils. The use of such complicated, bulky equipment may be drastically reduced.

As dusts appear to be relatively inefficient carriers of systemic materials, it seems entirely possible that, as new systemics are developed and problems of their use resolved, more sprays and fewer dust applications will be made. Such a change is already apparent to some extent in California cotton fields. More sprays are being used which incorporate a systemic material for mite or aphid control and another toxicant for control of insects not affected by systemics such as bollworm or lygus bugs. In the past, such applications would have been made in the dust form.

A large number of workers have tested methods of applications other than sprays with varying degrees of success. Some of these methods are soaking seed in systemic solution prior to planting; adding the systemic solution to the soil [3 modifications of this method are: (1) Adding a systemic solution to transplant water; (2) putting the toxicant in capsules which dissolve when placed in moist soil; (3) applying a systemic solution irrigation to plants in seed flats prior to transplanting] and applying the systemic material to the trunks and stems of trees by several methods such as bandling, painting, or injection.

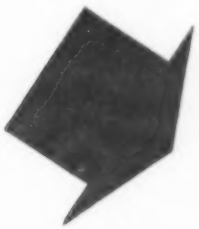
Control of Inaccessible Pests

WITH systemic insecticides, it is possible to control many pests which spend some or all of their life cycles in inaccessible localities on the plants, a situation which has always presented a difficult control problem with conventional insecticides. Hanna, *et al.* (1952) reported control of mealybugs, which are located under shelters built by ants. Systemic insecticides show promise in controlling root pests such as lettuce root aphids. Insects and mites inhabiting the lower leaf surfaces of dense plants growing close to the ground have presented a difficult problem in control. On such a problem, it has already been pointed out that control of mites and aphids on cotton with systemics presented no difficulties.

Residual Activity

MOST of the systemic insecticides investigated to date have shown residual activities over a considerable period of time. Certain insects, particularly aphids and mites, have a tendency to develop in large numbers on young, tender leaves and shoots. In order to maintain control of such pests on rapidly growing portions of plants, repeated applications of conventional insecticides are necessary. The ability of some systemic insecticides to translocate into such new growth as it develops in sufficient amounts to render it toxic appears to be a promising aspect of these materials.

Watson (1944) in England and Dickson (1952) in southern California, in working with plant viruses, have shown that insect vector control in the field will not protect the plants from virus infection, when the insect vectors are coming into the field from outside areas. Dickson confirmed this with the use of systemic materials. Ernould (1951) demonstrated, however, that when the virus vector is located only in the field to be treated, the spread of the virus within that field may be curtailed.



recent studies on systemics point to increased use of spray applications on non-food crops

Protection to Beneficial Insects

MANY of the new systemic insecticides are specific in their toxicity to certain groups of insects or mites. OMPA and "Systox", for example, have shown high toxicities to many mite species, but Reynolds, *et. al.* (1953a) pointed out that neither material was effective when used for control of the cyclamen mite on strawberries. One of the carbamate systemic materials (Isolan) is extremely toxic to aphids, but appears to be nearly ineffective when used for mite control (Reynolds, 1953a). In general, it appears that the systemic insecticides developed to date are outstandingly effective for control of most species of mites, aphids and mealybugs and have shown moderate toxicity to only a few of the species in which tests have been made of scales, thrips, leafminers and leafhoppers. Recently, David and Gardiner (1953) showed that E-600, the oxygen analogue of parathion, when watered on the roots of cabbage plants, killed the larvae of *Pieris brassicae* L. as they emerged from their shells.

There seems to be hope, therefore, that future developments will bring forth systemic materials which will be toxic to a wider range of insects and mites. Ripper (1952) expressed hope that systemics might be developed which will control insects and larvae which feed within the plant. The future on cotton with systemics should prove interesting, to say the least, as far as control of pests such as boll weevil, pink bollworm, etc. are concerned.

The application of nonselective insecticides to the aerial parts of a plant reduces the populations of beneficial insects as well as of the pests. Some systemic insecticides are specific to certain pests and are relatively non-toxic to parasites, predators and pollinators. Ripper, *et al.* (1951, 1952) pointed out that OMPA has practically no insecticidal action by contact, although this idea has been modified by recent work (O'Brien and Spencer, 1953), showing that it is a highly effective contact toxicant to some Hemiptera and Homoptera. Even with systemic materials with considerable contact action, such as Systox, it may be possible to make applications to parts of plants (particularly woody plants) not inhabited by beneficial insects, and thus reduce injurious populations of certain species, and still preserve the natural enemies. On cotton it has been shown that Systox can be used with excellent results for mite and aphid control at rates which are relatively non-toxic to the natural enemies of cotton pests (Reynolds, *et al.* (1953b). Data obtained in southern California tests indicate that of several important beneficial insects, only the minute pirate bug, *Orius tristicolor* (White), is affected to any great extent by Systox at the recommended dosage of four ounces per acre. Perhaps, therefore, flare-ups of pests not controlled by Systox, such as the cotton bollworm, will not follow judicious applications of systemic pesticides, as has sometimes been the case with nonselective materials, such as parathion.

Tests in southern California (Atkins, 1953) indicate that the use of Systox is compatible with pollinating insects. Laboratory tests in which materials are screened for toxicity as dusts using the vacuum bell-jar duster technique (Farrar, *et al.* 1948) indicated that Systox formulated as a two per cent dust gave little or no kill of honeybees. Preliminary field tests made in cotton and seed-alfalfa fields resulted in no appreciable bee losses even when Systox was sprayed at one-half pound per acre right over the bee colonies.

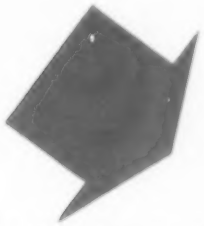
Residue Problem

THE residue problem with the use of systemic insecticides is an acute one, and certainly it is a limiting factor in their use at the present time. The use of systemic insecticides will be limited to crops such as cotton, ornamentals, nursery stock and other nonfood crops until the residue problem can be resolved. On food crops it must be established that there is no hazard to the consumer either from the material itself or its degradation products. At the present, therefore, it appears that residue-persistence curves should be worked out for the various crops concerned, where insecticide residues are a problem. This should apply not only to different crops, as the detoxifying mechanisms within different plant types undoubtedly differ, but also for the various times of year. Once residue curves are established with systemic pesticides, in all probability the residue at harvest can be predicted with more accuracy than with conventional insecticides, because the deposits of the latter type of materials are more subject to variable weathering factors such as rain, wind, volatilization, etc. Ripper (1952) contends that there is no greater risk from systemic pesticides than from conventional pesticides of equal toxicity. There is reason to believe that as other new systemic insecticides are developed, materials will appear with much lower acute toxicities than the ones in present use. An analogous situation in conventional insecticides is the development of parathion followed by the appearance of much safer phosphate materials such as malathion and chlorthion. Already experimental systemic materials are being investigated, which break down or are lost from the plant within a matter of a few days. The advantages of such short-lived materials on edible crops, particularly vegetables, are obvious. It appears that the use of systemic insecticides eventually will be no more restricted than in the case of surface insecticides.

Recently, Jones and Thomas (1953) in England have shown that OPMA is translocated into the nectar of flowers of mustard and borage in appreciable amounts. They concluded that this systemic insecticide may appear in an unchanged form in the honey obtained from the nectar of plants which have been sprayed less than four weeks previously. Perhaps this problem should be investigated on cotton.

Both OMPA and Systox have been accepted for use on cotton in California. It has been shown earlier

that Systox is translocated to only a small extent from the point of application when sprays are applied to the plant. In addition, it has been shown that Systox, if it is present, breaks down in the extraction of cottonseed oil by the heat process. OMPA was used on a semi-commercial scale during 1953 in California. As a consequence of the utilization of cottonseed oil in the preparation of food products, it became of interest in southern California (Metcalf and Reynolds, 1953) to establish the possible levels of contamination of cotton seed, oil, cake, and other products resulting from the use of OMPA. Radiotracers were used for this purpose because of the extreme sensitivity of detection, and the simplicity of assay as compared with the other analytical methods (Hartley, *et al.* 1951, Hall, *et al.* 1951).



"Systemic insecticides developed to date are outstandingly effective for control of most species of mites, aphids and mealybugs"

The radioactive OMPA was applied at a rate of one pound per acre to a heavy stand of Acala 4-42 variety cotton in the Coachella Valley, California. Forty-one days after treatment the cotton was ginned, hulled, the meats ground to a coarse meal, and the raw oil extracted by means of a heated hand press. Samples of the whole seed, ground meal, residual cake, lint, and raw oil were assayed for radioactivity. The radioactive material was then partitioned between $HCCl_3$ and NaOH to determine the nature of the radioactivity present, i.e. whether it was unmetabolized OMPA, or its degradation products. In the raw cottonseed oil, the activity ranged from 8 to 16 p.p.m., which partitioned strongly in the $HCCl_3$ and was apparently, therefore, almost entirely $OMP^{32}A$. After refining, however, only trace amounts of activity remained, some 1/400 to 1/00 of that initially present. Most of the OMPA in the raw oil was evidently present in the soapstock (foots), which contained about 70-80 p.p.m., a large portion of which was unmetabolized $OMP^{32}A$. It is apparent from this test that the water soluble OMPA has a decided affinity for the oily seed, but that the appreciable residues present in the oil were largely removed by refining. High residues in the cottonseed cake are almost entirely P-containing breakdown products of OMPA, which are physiologically inactive and should be relatively non-toxic.

Problems of Evaluation

THERE are many complex problems involved with the use of systemic pesticides which need evaluation. Many of these problems are concerned with factors which influence the absorption, translocation and ultimate distribution of these materials in the plant. The age of the plant, growth vigor, weather factors, soil conditions, light intensity, and physiological variations appear to affect the efficiency of the systemic materials. Many examples from the literature could be cited. Ripper, *et al.* (1951) showed that dry, hot weather was more favorable for absorption than humid conditions. Grob (1952) found that humidity was an important factor. At a humidity of 52 to 68 per cent, aphids were killed from trunk applications of Isolan (isopropyl methyl pyrazolyl dimethyl-carbamate) on young apple trees in 72 hours, whereas it required 10 days at humidities of 90-95 per cent.

Jeppson (1953b) found that soil, foliage and trunk applications of OMPA and Systox to mature lemon trees indicate that (1) soil applications were much less efficient than foliage or trunk applications; (2) trunk applications made from May to November were much more effective than winter treatments; (3) trunk applications persisted longer than did sprays in the summer months; and (4) spray applications persisted longest from October to June, although a high initial mortality resulted by this method regardless of period applied. He reasoned that high temperatures resulted in less material from sprays entering the plant as a result of evaporation and other losses. Casida, *et al.* (1952) showed that soil type and available soil phosphorus may alter the effectiveness of OMPA. Much of the accumulated knowledge of spray additives which affect spreading, adhesiveness, etc. may not be applicable to systemics. Therefore, studies should be made of spreading, penetrating, stabilizing agents or other additives, which may affect the usefulness of systemics.

The degree of control obtained of the same pest with systemic insecticides has been shown to vary on different plant species. An example of variation of control resulting on different plant types is found on cotton and sugar beets grown for seed. Systox on cotton gives, as near as can be determined, complete mortalities of the two-spotted mite at dosages as low as three ounces per acre, whereas on sugar beets when the seed stalk is several feet high, the mortalities obtained at dosages of eight ounces per acre are only about 60-90 per cent (Reynolds, 1953c).

Since many of the inherently complex factors regarding the complete understanding and successful use of systemic insecticides involve

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Secretary Ezra Benson Stresses Program of "Plentiful Abundance" at Ninth Annual Convention of

American Plant

TERMING fertilizers "one of the key elements in United States agricultural progress" which have "helped make possible real agricultural abundance," Secretary of Agriculture Ezra Taft Benson in his address, June 12th, before the ninth annual convention of the American Plant Food Council, Hot Springs, Va., put himself on record as favoring future farm programs based on abundance rather than on scarcity, and urged that farmers should continue to be encouraged to "use fertilizers and every other cost-reducing, yield-increasing practice that pays off."

He reminded his listeners, however, that the fertilizer industry—like farmers—and like the American people generally—must be concerned not only with producing abundance but also with finding a continually expanding market for this more and more abundant production. Marketing is the key to solving the farm problem, he averred, voicing the claim that the present administration is the first one to give to marketing the important place it merits in the agricul-

Top Photo: E. M. Kolb and Wm. J. Murphy, American Potash & Chemical Corp., New York; R. W. Goldthwaite, Lion Oil Co., El Dorado, Ark.

Bottom Photo: John G. Reynolds, Bethlehem Steel Co., Bethlehem, Pa.; A. Goldhaar, Universal Detergents, Inc., Long Beach, Calif.; Leroy Donald, Lion Oil Co., El Dorado, Ark.

Top Photo: Todd Lightfoot, The Lummus Co.; Mrs. Burnap, Chemical & Industrial Corp., Cincinnati; James Walker, The Lummus Co.; Mrs. & Mr. Fred Techter, Nitrogen Div., Allied Chemical & Dye Corp., New York.

Bottom Photo: John G. Reynolds, Bethlehem Steel Co., Bethlehem, Pa.; W. H. Mortimer and T. C. Rogers—Nitrogen Div., Allied Chem. & Dye Corp., New York; J. C. Crissey, Coop. G.L.F., Ithaca, N. Y.; W. L. Gay, Berkshire Chemicals, Inc., New York.

Food Council

tural picture. The goal, he believes, should be to help agriculture *market* its production, not stock it away in warehouses. It would help in achieving this goal, he indicated, if artificial price barriers blocking the movement of crops to markets, both at home and abroad, were removed. Over a period of years, he pledged, such a program would result in higher and more stable income for agriculture, larger and more permanent markets, and more efficient, balanced farming.

Turning to the role of fertilizers in this more abundant agricultural economy, the Secretary recalled that fertilizers account for at least 25% of present crop yields. But, he reminded, "though our agriculture is currently using two and one-half times as much fertilizer as in 1940, we are still nowhere near realizing its full potential. We are just learning what can be accomplished through heavy applications of nitrogen and other fertilizers. We can also make far better use of crop and animal residues. We need to know more about 'minor elements' and how to use them."

Effective use of larger amounts of fertilizers, the secretary reminded, "will require a highly-geared technology in the whole cropping system. We will need—in some cases—a completely new approach to crops and soils problems. We will need improvements not only in fertilizers, but also better adapted varieties of crop plants, with improved practices for controlling weeds, plant diseases, and insects; better machinery for applying both fertilizers and pesticides; improvements in cultivating and har-

Top Photo: Joseph A. Howell, Virgina-Carolina Chem. Corp., Richmond, Va.; Representative Walter Horan, Congressman, State of Washington; Paul A. Truitt, president APFC; E. W. Harvey, Nitrogen Div. Allied Chemical & Dye Corp., New York.

Bottom Photo: W. E. Nordquist and R. M. Maxwell, U. S. Steel Corp., Pittsburgh, Pa.

Top Photo: E. P. Kramer, Mississippi River Fuel Corp., St. Louis, Mo.; Miss Toni Richards; J. M. Boudewijn, Central Stikstof Verkoopkantur, N. V.; Mrs. Kramer; A. B. Baker, Jr., Bradley & Baker, New York; Mrs. E. K. Ludington, Jr.

Bottom Photo: Porter Brinton—Hydrocarbon Products Co., New York; E. K. Ludington, Jr.—Chase Bag Co., New York; John R. "Dugan" Taylor—Grand River Chemical Div. Deere & Co., Tulsa, Okla.; Joe Whittington—Mathieson Chemical Corp., Baltimore.

vesting equipment; and more efficient use of our water resources."

And if farmers are to use the vastly increased quantities of fertilizer the soils of the Nation require, he added, costs must be held down to a reasonable relationship with farm prices, by means of improved manufacturing processes, more efficient merchandising, and other cost-cutting methods.

DEVELOPING another phase of the important and pressing farm problem, Rep. Charles B. Hoeven warned APFC members that "a program of balanced farm production can be carried out only if the farmer has some assurance of a stable income." The farmer, he reminded, is caught today in a price squeeze, with prices for practically everything he must buy remaining high, while prices which he receives have dropped substantially, reducing net farm income in the past few years.

The farmer is not himself to blame for farm surpluses, said Mr. Hoeven. They accumulated because the Federal government throughout the war years urged the farmer to expand his production to the limit, and then when surpluses eventuall · began to develop, the government failed to act promptly to restrict production.

Rep. Hoeven joined with Sec. Benson in endorsing a farm program based on abundance rather than on scarcity. "We have a hungry world on our hands," he observed, "and the world's population is increasing more rapidly than the world's food supply. This means that the farmer must produce more agricultural products in the years ahead. With a few exceptions we have already reached the saturation point as far as new farm land is concerned. So if we are to expand production to meet an expanded population, we will have to increase the productivit; of the land we now have."

PAUL Truitt, APFC president, predicted in his convention address that in all probability 1953-54 consumption of fertilizer will set new records for the seventeenth consecutive year. Credit for continually expanding use of fertilizer, he said, should be given to accelerated extension, research and educational programs of state and federal agricultural agencies.

Mr. Truitt reminded however that if this rising trend in fertilizer use is to be continued, "a better selling job must be done by the fertilizer industry and all others concerned with a more efficient farming system." He added that "we all have the responsibility of working more closely and more effectively with the USDA and land-grant colleges, their extension services and experiment stations, with the soil conservation program and with vocational-agricultural teachers—all interested in learning how to farm better and more efficiently."

"Too many folks have not drawn a distinction between the problem of surpluses and efficiency in farming—efficiency which is realized through the proper use of plant food," he said. "All should understand the importance of lowering the per unit cost of farm production.

Associated with the all-important job of education and promotion, added Mr. Truitt, is the task of securing better public relations for the fer-

Top: Louis Wilson, director of information of APFC, with award winners Robert P. Crossley, Capper's Farmer, and Earl W. McMunn, The Ohio Farmer, in the APFC-aponsored Soil Builders Contest.

2nd Photo: The Agricultural Public Relations Panel: (standing) Stanley Andrews, Mich. State College, and Robt. H. Reed, editor of The Country Gentleman, moderator of the panel. (Seated) J. M. Eleazer, Clemson, and Ed Lipscomb, Natl. Cotton Council.

3rd Photo: Lockwood Frizzell, Arkell & Smiths, Columbus, O.; J. Fred Corkill, Pacific Coast Borax Co., New York, N. Y.; Tom Jones, Arkell & Smiths, Columbus, O.; John Paul Jones, Western Phosphates, Inc.

4th Photo: M. W. Whipple, Olds & Whipple, Inc., Hartford, Conn.; Harry Hughes, John Dively and John F. Gruber, St. Regis Sales Corp.

5th Photo: J. W. Reisack, H. J. Baker & Bro., F. A. Davis, Spencer Kellogg & Sons; John Hall, Potash Co. of America, Washington, D. C.

Bottom Photo: John Sanders, Spencer Chemical Co.; B. D. Cloaninger, American Fertilizer Control Officials, Clemson, S. C.; H. G. Cunningham, Tennessee Corp., Atlanta, Ga.; G. W. Suggs, Nitrogen Div., Allied Chemical & Dye Corp., New York, N. Y.

tilizer industry's customer,—the farmer. Seconding the suggestion by another speaker, Mr. Lipscomb, that fertilizer manufacturers take under consideration the possibility of setting up and sponsoring a public relations program for the farmer, Mr. Truitt indicated his belief that such a step could be an important phase of a "better selling" job by the fertilizer industry.

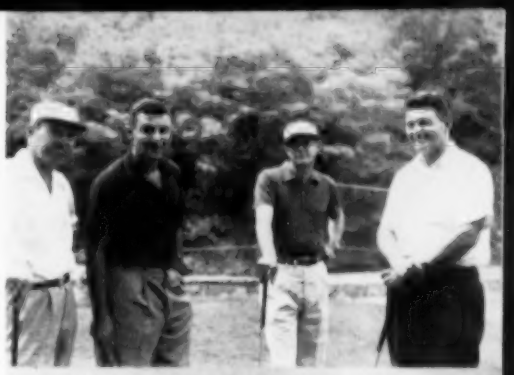
FEATURE of the convention program at the opening session, June 11th, was a panel on the subject of "Agricultural Public Relations" moderated by Robert H. Reed, editor of the *Country Gentlemen*. He recommended strongly that agriculture turn to the business man for help in working out farm problems, and advised specifically that "business can shoulder a great part of the public relations job for agriculture, and business can teach salesmanship to agriculture." Noting that "there never has been a time when the farmer rated lower with the general public," he emphasized that "agriculture can, and must, improve its public relations."

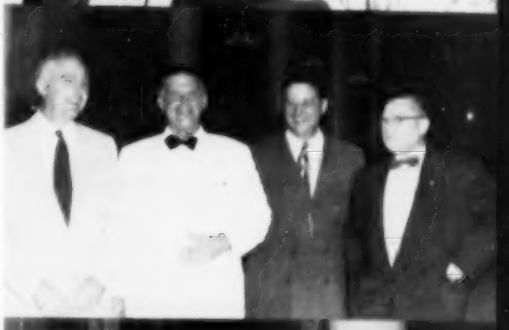
Stanley Andrews, executive director of the National Project in Agricultural Communications, Michigan State College, and a participant in the panel, reported that "developments and techniques in the use of mass communications as extension teaching arms" are helping to make it possible for agriculture to keep pace with industry and other parts of the economy. He reminded that no country in the world spends more money than do we in gathering and distributing basic statistical data bearing on every segment of our business and government life, including agriculture.

"How to Talk to Farmers" was the topic taken by J. M. Eleazer, extension information specialist, Clemson Agricultural College, who offered as the ideal "the humble speaker and writer, who keeps his feet on the ground, his eyes on science, and his words in the language of his folks". He reminded that the farmer wants the essentials only, in his busy, practical life, and is normally not interested in exhaustive articles, heavy technical material, or imposing tables, charts and graphs unless their meaning can be caught at a glance. The best writing,—at least for a farm audience, he concluded, is writing that is simple and original, and which lets the personality of the writer show through.

Final speaker in the panel was Ed Lipscomb, director of public relations for The National Cotton Council, who indicated that in his opinion the reason for the bad public relations record of the farm group is "faulty communications" and not "faulty performance." "The farmer has a better story than has been told," he observed. "He is misunderstood and unappreciated by the public through a combination of misinformation and lack of any information at all."

An important reason why the farm community has failed in the field of public relations, said Mr. Lipscomb, has been "the absence of any adequate, coordinated, national effort to create in the public mind a true understanding of the farmer's problems, position and progress." Mr. Lipscomb suggested that this situation could be remedied by some national trade association group, such as the American Plant Food Council, under-





Top Photo: A. F. Pringle, Jr., A. F. Pringle & Co., Inc., Charleston, S. C.; J. C. Bauman, Union Bag & Paper Corp., Jacksonville, Fla.; N. J. Kelly, Acme Fertilizer Co.; J. W. White, Union Bag & Paper Co., New York, N. Y.

2nd Photo: Ray Yates, Ashcraft-Wilkinson Co.; Mrs. W. Merritt, New York, N. Y.; Al Dickinson, Virginia-Carolina Chemical Corp., Richmond, Va.; C. J. Bown, Grace Chemical Co.

3rd Photo: Sid Keel and G. W. Moyers, International Minerals & Chemicals Corp., Chicago, Ill.; E. N. Shelton, Tennessee Corp., Atlanta, Ga.; R. H. Linderman, International Minerals & Chemicals Corp., Atlanta, Ga.

4th Photo: Dr. J. A. Naftel, Pacific Coast Borax Co., Auburn, Ala.; E. K. Ludington, Jr., Chase Bag Co., New York, N. Y.; H. H. Tucker, Coke Oven Ammonia Research Bureau, Columbus, O.; E. W. Harvey, Nitrogen Div., Allied Chemical & Dye Corp., New York, N. Y.

5th Photo: George F. Cech and Paul Logoue, Monsanto Chemical Co.; Dean Gidney, U. S. Potash Co., New York, N. Y.; R. H. Hodgson, Mathieson Chemical Co., New York, N. Y.

Bottom Photo: C. E. Gettinger, Woodward & Dickerson, Inc., Philadelphia, Pa.; Mrs. C. J. Bown; C. J. Bown, Grace Chemical Co.; R. P. Ackerman, Jr., Grace & Co.

Upper left: Professor Grant B. Snyder, Natl. Junior Vegetable Growers Assn.; Dr. J. C. Willard, president, American Society of Agronomy; Dr. Paul Talley, Lion Oil Co.; Dr. Proctor Gull, Spencer Chemical Co.; and Dr. Tom Cox, American Cyanamid Co.

Upper right: W. B. Copeland, Smith-Douglass Co.; George W. Gage, Anderson Fertilizer Co.; and Richard F. Hopkins, Smith-Douglass Co.

Lower left: Three of the speakers on APFC program: Rep. Charles B. Hoeven, Secretary of Agriculture Ezra Taft Benson, Paul T. Truitt, president of APFC, and Dr. Paul D. Sanders, Editor, Southern Planter.

Lower right: L. I. Jones, USDA; W. T. Wright, F. S. Royster Guano Co.; J. A. Howell, Virginia-Carolina Chemical Corp.; George E. Petitt, Potash Company of America, and Dr. Paul Sanders.

Above photos courtesy of Louis Wilson, secretary and director of information of APFC.

Ashmead F. Pringle, Jr., (left) A. F. Pringle & Co., Charleston, S. C., and John C. Bennett, American Cyanamid Co., New York.

Edwin Pate (left), Dixie Guano Company, was elected Chairman of the Executive Committee of the APFC at the Hot Springs Convention. He is shown with Council President Paul T. Truitt.

taking to provide such a program for the farmer as a national service, setting up a centrally-operated national program, adequately financed and staffed.

He suggested also that until some such group is prepared to undertake such a program for the farmer, individual fertilizer manufacturers could help fill the gap, at minimum cost, by supplying public relations material to their dealers. He suggested that dealers be supplied with the text of a standard talk on fertilizer and its efficient use for local presentation. This might well be accompanied, he suggested, by a publicity presentation for local newspapers. Dealers could be supplied with a package public relations and publicity program for local use in their areas at a very moderate cost, he indicated. He suggested also that in advertising programs room be found for an occasional piece of institutional copy carrying a pat on the back for the farmer.

DR. H. B. James, head of the Department of Agricultural Economics of North Carolina State College, shared the platform with Rep. Hoeven and Sec. of Agriculture Benson at the June 12th session of the convention, speaking on "The Agricultural Economic Outlook." He declared that the long-term outlook for agriculture is favorable compared with its status during the past century. Terming fertilizer "an extremely important factor in agricultural production," he said "it amazes me that the fertilizer industry does not sell as much fertilizer as it would be profitable for their customers to buy. Although North Carolina uses more chemical fertilizer than does any other state, at 1951 prices it would have paid North Carolina farmers to use about twice as much

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Adapting Herbicides to diversified farming

By Jack Dreesen
National Agricultural Chemicals Association, Washington, D. C.

TWO divergent viewpoints pertaining to the use of herbicides in agriculture are slowly being brought into alignment with a single program of practice for the use of these chemicals throughout the United States. The root of the difference between these two viewpoints is the attitude of farmers who are influenced by the type of crops they raise. Individuals who have received great benefits from herbicides have come to lean heavily upon them to reduce their costs of production. On the other hand, individuals who raise crops that may be susceptible to injury by certain herbicides feel justified in attempting to prevent the use of such herbicides in their areas. Equally concerned about the situation, each group presses for what it assumes to be its rights.

There are many manifestations of these diverse viewpoints which are important in establishing short-range and long-range programs for research and development of weed control chemicals and related products for the farm. It may clarify the issue to re-examine the elements that are involved on a national basis, which should influence the direction of research, development, and use of herbicides.

It is important to note that the problems involved in this situation are of a regional character only. Yet, the significance of the problem when compared to the volume of use has assumed attention out of all proportion to the total national picture. A large portion of the herbicides produced today are used in areas which present no great hazard to susceptible crops, simply because those crops are not grown in the areas.

The U. S. Department of Agriculture reports that some 25 million acres of small grains and corn are treated with herbicides each year, for the most part with the principal chemicals involved in this problem. Only a very small part of the acreage being treated occurs in the critical areas of diversified farming, where susceptible crops are grown.

Farmers in these diversified farming areas recognized the great benefits of weed control in cereals, and transplanted these practices from the northern Great Plains and the Midwest without the critical attention to precautions for use, which appeared on the labels of the herbicides. In these mixed-crop areas, the margin for error being as small as it is, inattention to proper directions for use of herbicides was bound to result in crop injury and it did. Yet, research data of the industry and of federal and state agencies plus the label directions were sufficiently extensive to emphasize that such a situation might arise if the products were misused. Carelessness in application of the phenoxy compounds especially aggravated the situation.

The fact that label directions were not adhered to, and insufficient recognition was given to precautions for safe use, is water under the bridge. The first consideration now, in solving the problem is how to use the best agricultural practices to derive the greatest good for the greatest number of farmers, without depriving them of any of their rights.

As usual in such situations, the strength of public reaction can be gauged from the quantity and variety of legislation which follows. There has been a rash of public hearings to discuss the differences of opinion relating to this subject. This year, Texas banned the use of 2,4-D in seven Coastal Bend counties in which rice fields were interspersed with cotton fields. Recent modification of this regulation permits the use of 2,4-D in these areas under the express permission of the Commissioner of Agriculture. This indicates an increasing amount of agreement in established practice.

Right now, 13 states have laws which regulate the sale and application of herbicides, and these regulations may apply to the custom applicator, to the manufacturer, to the dealer, or to farmers and other users. The fact that these laws have been enacted is an indication that the best practices in the use of herbicides have not been accepted voluntarily by the user, even though the practices have been carefully worked out from research data, and such information is required by law to be part of the label. Therefore, the officials of these areas have resorted to legislation to

protect the user and to require him by legal means to adhere to the established practices of safe-use, when using herbicides in these areas. Until users accept these practices, we can expect more legislation of this type.

Farmers who grow susceptible crops and who desire to restrict the use of certain herbicides to protect their crops have shown considerable strength in presenting their viewpoint, as manifested by legislation. On the other hand, those who wish to use herbicides in these areas have come up with some practical answers. They point out that by following label directions and recommendations for use as devised by land grant colleges and others the materials can be used without injury. Apparently they feel that an arbitrary banning of these chemicals is not the answer. They feel that it is better to work out a program of farm practice through education, which will conserve the rights of all, without resorting to legislation. Legislation alone is not sufficient to solve the problems in these areas, but must have the support of farmers in following sound programs to accomplish the purpose.

It appears that we do have an organized program of use which will get the desired results for the farmer and at the same time preclude injury to adjacent property. We have devised such a program but a greater effort must be made to get the farmer to accept and use the principles involved. Unless we do so, there is little ground for criticism of those who enact legislation in an attempt to solve the problem. There is merit to the belief that at least a greater effort can be made to orient the various uses of the herbicides and the various chemicals available for the job to be done. This is the only defense against restrictive legislation.

The first consideration must be to define the area in which problems are created in the use of herbicides. The manufacturer, the farm leader, and the research worker must determine whether the materials can be used without injury in a particular diversified farming area. If the risk is so great that the use of a chemical may cause more harm than good, it seems that it would be inadvisable to recommend the product for such areas. Not only does it cause ill will in those areas but the fear of hazard may spread into areas where hazard is a remote possibility and a subsequent curtailment of the use of valuable herbicides may occur. The determination of whether a product should be used can be based on the extensive knowledge available to research workers, farm leaders and members of the industry. If there is ground upon which a program of safe use can be designed, it would be desirable to exhaust every possibility before discriminating against the use of these products.

In some cases, a system of timing could be devised so that herbicides are used before susceptible crops are planted or after they are harvested. There is a possibility of arranging crops so that there is a minimum of intermingling of susceptible varieties with other crops on which herbicides are used. Once it has been decided that a herbicide can be used on a limited basis in diversified farming areas, a special effort must be made by industrialists, farm leaders and research workers to point out these limitations to dealers and farmers.

In areas where highly susceptible crops are grown, emphasis on precautionary measures in handling and applying these herbicides is also part of the picture in reducing damage. The discouragement of the purchase of certain herbicides in bulk quantities and breaking them down into smaller lots without proper labeling would serve to eliminate part of the hazards and resultant claims for damage. Discouragement of this practice could be obtained by pointing out the hazards which are involved as compared to the benefits in pricing or other gain that may be obtained. It is especially important in these areas that spray equipment used to apply certain of these herbicides should definitely not be used to apply insecticides or other pest control chemicals which may become contaminated and result in serious damage to susceptible crops.

Other hazards that contribute to injury in these areas include the use of drums for water barrels and for transporting and storing fertilizer, seeds and feeds. Faulty containers during transportation or storage have also given rise to isolated instances of crop injury.

As far as the chemicals themselves are concerned, there is at present a wide selection of herbicides which can be used in various situations to do a particular job. The introduction of new herbicides is occurring so rapidly that it is reasonably certain the problem of weeding crops chemically in diversified farming areas will not be with us for many more years. Already those materials which are the most controversial are being replaced by herbicides which present much less hazard to crops grown in the critical areas. At present, the acceptance of herbicides of various kinds in these areas is important to agricultural progress as well as to the future of the industry. It would be better to limit the use of certain herbicides in these areas, now, with a view toward developing this market more fully when less hazardous materials become available.

It would be unfortunate if this limited market for some herbicides were to curtail the large market for these chemicals in other parts of the United States. We must make certain that the publicity on the benefits of chemical weed killers on a vast acreage of crops offsets the unfavorable reports of crop injury in a limited area.

We can emphasize that no one herbicide is a panacea for all weeding problems—that in many instances two or more chemicals may be necessary for a complete weed control program on the farm. The farmer and the industrialist would both benefit by delineation of the scope and limitation of each of these products, but at the same time show the effectiveness of a complete program using several chemicals. On the other hand, the enthusiasm for using these products should not improperly influence the judgment of those who must decide where and how herbicides should

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NATIONAL FERTILIZER ASSOCIATION Holds 29th Conference

Panel Discussions on Fertilizer Sales and Granulation Methods Highlight NFA Spring Meeting

Above: Louis Ware, retiring NFA chairman; H. Coleman, president NFA; and Congressman W. Sterling Cole, New York.

At left: E. A. Geoghegan, newly elected chairman of the NFA Board of Directors; and C. T. Prindeville, vice-chairman.

Top Photo: Granulation panel: John O. Hardesty, USDA; E. C. Kapusta, NFA; L. D. Yates, TVA; R. J. Englehard, John J. Harte Co.; and W. W. Coffin, Link-Belt Co.

Bottom Photo: Fertilizer sales symposium members: G. Smith, Univ. of Missouri; H. H. Tucker, Coke Oven Ammonia Research Bureau; H. R. Dinges; Spencer Chemical Co.; and O. E. Anderson, Ohio Bankers Assoc.

TWO symposia dealing with the granulation of fertilizer, and fertilizer sales highlighted the technical sessions of the 29th annual meeting of the National Fertilizer Association. More than 850 members and guests attended the three-day session, June 14-16 at the Greenbrier Hotel, White Sulphur Springs, W. Va. An excellent set of talks on current industry problems and questions had been arranged by the program committee, while committees in charge of various recreational events directed ladies' and men's golf, tennis and horseshoe tournaments, etc.

Featured guest speaker of the opening session was Secretary of

Agriculture, Hon. Ezra T. Benson, who stressed the goal of American agriculture as "Useful, permanent abundance." Secretary Benson observed that

"To be useful, abundance must be marketed. That is why this Administration is focusing more attention on agricultural marketing than it has ever received before. That is why we are stressing marketing and utilization research and education. That is why we have sent trade missions abroad — stimulated surplus disposal programs — carried on barter programs — inaugurated aggressive merchandising campaigns — and sought the cooperation of trade groups as never before.

"But for abundance to be permanent, we need to conserve and build our natural resources—we need to safeguard farm prosperity — we need to lay emphasis on farming efficiency, on balanced farming, on new technology, and on the research and education which help to make all these aims possible."

The secretary called for a well-rounded attack on the problem of soil and water conservation. He reviewed the progress that is being made in soils study . . . the effects of certain kinds of fertilization on

(1) C. E. Gettinger, Woodward & Dickerson, Inc., Philadelphia; G. Barley, Diamond R Fertilizer Co., and L. H. Wright, Phillips Chemical Co., Bartlesville, Okla.

(2) M. H. Lockwood, International Minerals & Chemicals Corp., Chicago, Ill.; W. J. Haude, Grace Chemical Co., New York.

(3) T. L. Jones, Arkell & Smiths, Columbus; A. E. Schneider, Stedman Foundry & Mach. Co., Aurora, Ind.; S. S. Yates, Arkell & Smiths, New York, N. Y.

(4) Mr. and Mrs. Wm. Merritt, H. J. Baker & Bro., New York, N. Y.

(5) W. F. Price, Swift & Co., Chicago; Mrs. William Darcy; W. J. Murphy, American Potash & Chemical Corp., New York.

yields, and the need for precise information for each important crop under different climatic conditions, on various soils, at particular moisture levels. He observed also the need for conservation to meet an approaching acreage deficit which will eventually result as population continues to expand.

The secretary reminded his listeners that, "In the next two decades we must, in effect, add somewhere between 100 and 165 million acres of cropland or its equivalent to the farm plant. We can expect to have the equivalent of 507 million acres available to meet the needs of our human population. But at the current levels of efficiency, that amount would fall short by nearly 100 million acres of meeting the needs of the population of 1975, using as the population figure the lowest estimate of the Census Bureau. With population at the Bureau's highest estimate, we would need 165 million additional acres — an increase of about a third, which means four acres for every three actually available."

Conservation of land and water, improvement of crops and livestock, a decrease in losses due to waste, diseases, insects, shipping and marketing difficulties were cited as some of the lines of attack to meet the problem.

Congressman W. Sterling Cole, New York, chairman of the Joint Congressional Committee on Atomic Energy, spoke at the second day session, reviewing the peace-time uses of atomic energy. Some of the uses cited included: radioisotopes in agricultural research; research in the physical sciences and industry in general; atomic radiation in therapy; and food sterilization. Congressman Cole discussed also the role of the phosphate industry in by-product extraction of uranium.

(1) J. Manasse, Werthan Bag Corp., Chicago, Ill.; W. J. Chapin, Swift & Co., Chicago, Ill.; C. Byrd, Spencer Chemical Co., Kansas City, Mo.

(2) W. W. King, C. E. Jenks, W. S. Tyler Co., L. Turner, International Paper Co., Baltimore, Md.

(3) J. R. Hughes, Meeker-Hughes Co., Inc., Salem, Ore.; Mrs. J. R. Hughes, Salem, Ore.; Mrs. W. R. Allstetter, Washington, D. C.; W. R. Allstetter, The National Fertilizer Assoc., Washington, D. C.

(4) R. E. Ashcraft, Ashcraft-Wilkinson Co., Norfolk, Va.; E. M. Kolb, American Potash & Chemical Corp., New York, N. Y.; E. German, Duval Sulphur & Potash Co., Houston, Texas; H. N. Hayden, Wilmington Fertilizer Co., Wilmington, N. C.

(5) Dr. R. Coleman, National Fertilizer Assoc., Washington, D. C.; D. R. Gidney, U. S. Potash Co., New York, N. Y.; V. A. Frizzell, The Triangle Co., Salinas, Cal.

(6) Mr. and Mrs. S. L. Nevins, Mathieson Agricultural Chemicals, Little Rock, Ark.

(7) L. E. Quiram, Illinois Farm Supply Co., Chicago; L. R. Boynton, United States Potash Co., Atlanta; C. Venoble, Tennessee Farmers Coop., Nashville.

(8) J. C. Mooar, Sturtevant Mill Co., Atlanta; W. T. Doyle, Sturtevant Mill Co., Boston.

(9) J. K. Sparkman, U. S. Phosphoric Products, Tampa, Fla.; M. G. Geiger and W. N. Watmough, Jr., Davison Chemical Corp., Baltimore.

(10) G. E. Smith, University of Missouri, Columbia, Mo.; Mrs. Smith, and Fred Techter, Nitrogen Div., Allied Chemical & Dye Corp., New York, N. Y.

Fertilizer Use Still Expanding

THE many activities of the N.F.A. were reviewed and discussed by chairman Louis Ware, president of International Minerals & Chemical Corp., Chicago, who pointed to NFA work with agricultural colleges, experiment stations, extension services, publications of the Association, education of farmers and bankers in its "banker program," etc. In discussing the farmers' production costs, Mr. Ware observed that the "comprehensive analysis of the economics of fertilizer usage has served to spotlight a basic principle which can contribute immeasurably towards the solution of the nation's agricultural problems. When a farmer is forced to cut back his production this usually is tanta-

mount to a cut in his income. If, however, he can at the same time increase his margin of profit on each bushel or each pound he produces, it may be possible for him to maintain—even increase—his income even though his total production has been cut back. Studies are now showing that by using plant food to cut unit production costs, farmers can do just this. That is, they can increase their profits per unit enough to maintain or increase their income from major crops, not only on less total acreage but from less total production.

"The benefits of our industry's market development program can be measured in consumer demand for fertilizer. During the past two years, despite a 16% decline in farm income, the consumption of plant food has increased by about 10%. This continuing increase in demand in the face of lower farm prices and income, has reversed the old established parallel relationship between fertilizer sales and farm income."

"It is significant, I think, that during this season there has been an increase in the sale of plant food in most areas even though acreages of several major crops have been reduced materially below those of last year. I am confident that the leadership of NFA in the industry program for developing broader markets is a major contribution to these encouraging trends."

Continuous Granulation Discussed

EDWIN C. Kapusta, chemical engineer of the National Fertilizer Association, served as moderator of the Granulation Symposium, in which four panel members participated. W. W. Coffin, Link-Belt Co., Chicago, discussed the "Link-Belt Martenet Process for the Manufacture of Homogeneous, Granular Free-Flowing Fertilizer." (Editor's Note: This process is described in the April issue of *Agricultural Chemicals*, pages 46-48).

The process consists of mixing continuously, in a paddle mixer, an ammonia-ammonium nitrate solution, superphosphates, and potassium compounds. After screening and heating, the slurry is mixed with recycled material and air-cooled . . . the material is then passed through a nodulizing cylinder and dryer. The product is granular, dry and homogeneous.

Left Top Photo: J. F. Corkill, Pacific Coast Borax Co., New York, N. Y.; Mrs. J. F. Corkill; H. A. Davis, Assoc. of American Fertilizer Control Officials, Durham, N. H.; B. D. Cloaninger, American Fertilizer Assoc., Clemson, S. C.

Left Bottom Photo: (Standing) C. A. Lawton, American Potash & Chemical Corp., Columbus, O.; C. L. Straughan, American Potash & Chemical Corp., Atlanta, Ga.; L. B. Nelson, U. S. Dept. of Agriculture, Beltsville, Md.; N. E. Wendt, American Potash & Chemical Corp., Williston Park, N. Y.; E. Kolb, American Potash & Chemical Corp., New York, N. Y.; (Seated) Mrs. E. Kolb, New York, N. Y., Mr. and Mrs. W. J. Murphy, American Potash & Chemical Corp., New York, N. Y.

Right Top Photo: M. E. Hunter, F. Techter, Nitrogen Div., Allied Chemical & Dye Corp., New York, N. Y.; B. S. Chronister, Nitrogen Div., Allied Chemical & Dye Corp., Hopewell, Va.; H. Riemer, Nitrogen Div., Allied Chemical & Dye Corp., New York, N. Y.

Right Bottom Photo: C. Mittleman, Kraft Bag Corp., New York, N. Y.; C. R. Shirk, Chemical Packaging Corp., Savannah, Ga.; M. S. Malone, International Minerals & Chemicals Corp., Atlanta, Ga.; (seated) Mrs. C. R. Shirk, Savannah, J. W. Rutland, Western Carolina Phosphate Co., Waynesville, N. C.

The process produces all ratios of fertilizers in a very high degree of plant food concentration; and allows a wide range of particle sizing. The fertilizers so produced are said to store over indefinitely long periods in bulk or bags without fear of cementing together even when piled 20 bags high or in silos a hundred feet in height. This assures perfect drilling condition in fields.

Large savings are made in the cost of nitrogen by utilizing low cost ammonia and ammonium nitrate solutions as the sole source of nitrogen; savings are made also in the cost of pentoxide, because the high concentration of ammonia and ammonium nitrate permits a larger proportion of pentoxide to be derived from lower cost normal superphosphate. Another advantage of the process is that no period of curing is necessary, allowing greater turnover of storage, and saving of storage facilities and costs.

In a discussion period following the reports by panel members, Mr. Coffin pointed out that the raw materials used in the continuous process were ground to 10-mesh by hammermills, before use in the operation. Replying to questions from the audience, he indicated also that the Link-Belt Martenet Process served equally well in granulation of all grades of fertilizers, specifically, 0-20-20; 0-0-1; and 8-32-0.

Replying to a question as to when ammoniation actually takes place, he

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Board Members Elected

Acting on the report of J. E. Totman, Summers Fertilizer Co., Baltimore, chairman of the Nominating Committee, NFA members re-elected the following as directors at large: Russel Coleman, president of NFA; Washington, D. C.; L. G. Black, Ark-Mo Plant Food Co., Corning, Ark; James W. Dean, Knoxville, Tenn.; Walter E. Meeken, Consolidated Rendering Co., Boston; John A. Miller, Price Chemical Co., Louisville, Ky., and C. T. Prindeville, Swift & Co., Chicago. J. L. Hockley, Mathieson Chemical Corp., Baltimore was elected to the board on the resignation of J. C. Leppart, New York.

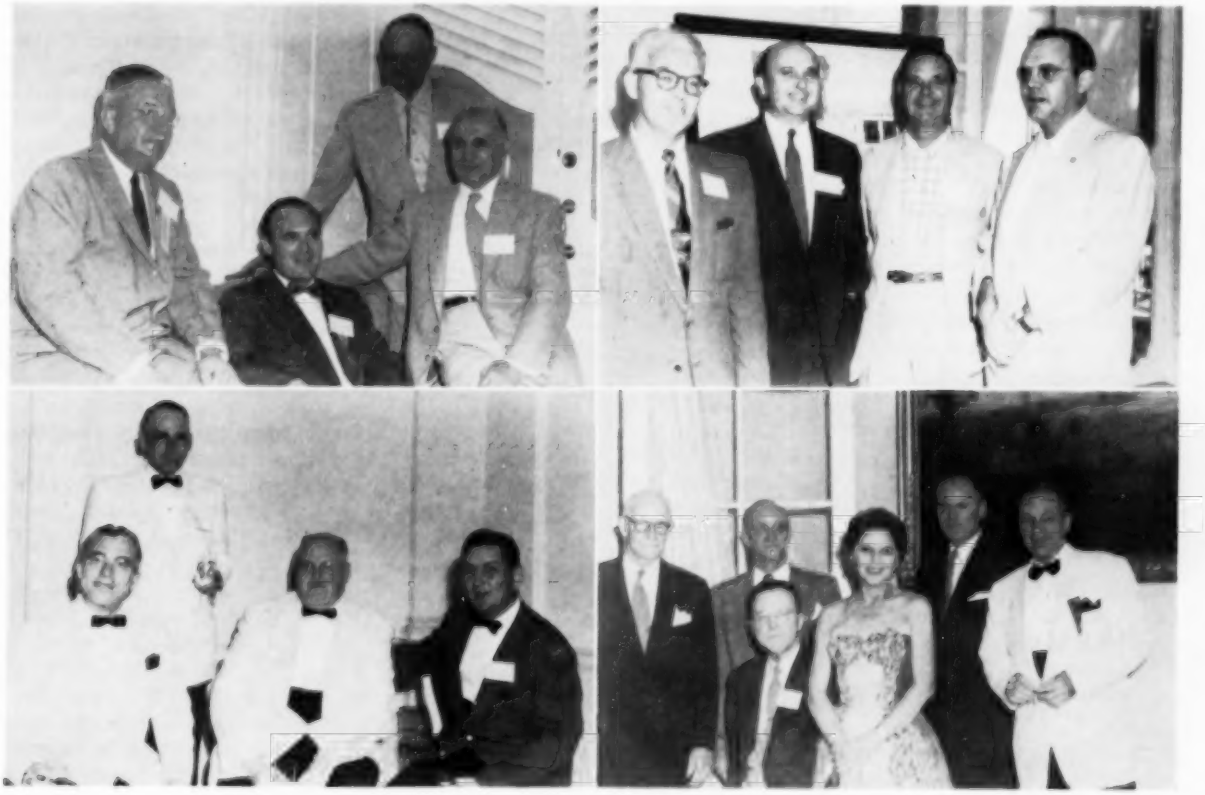
Newly elected district directors for the term appointed are as follows: (1) E. R. Jones, Apothecaries Hall Co., Waterbury, Conn.; (2) A. A. Schultz, Reading Bone Fertilizer Co., Reading, Pa.; (3) E. J. Buhner, Buhner Fertilizer Co., Seymour, Ind.; (4) W. N. Watmough, Jr., Davison Chemical Corp., Baltimore; (5) J. H. Epting, Epting Distributing Co., Leesville, S. C.; (7) Moultrie J. Clement, Pensacola, Fla.; (8) M. G. Field, Meridian Fertilizer Works, Hattiesburg, Miss.; and (10) J. B. Snyder, Snyder Chemical Co., Topeka, Kan.

Left Top Photo: W. Caspari, Jr., Davison Chemical Co., Baltimore, Md.; J. A. Barr, Jr., U. S. Atomic Energy Commission, Washington, D. C.; F. J. Purcell, Combustion Engineering, Inc., Atlanta, Ga.; V. Sauchelli, Davison.

Left Bottom Photo: C. C. Keefer, St. Regis Paper Co., Louisville, Ky.; E. N. Shelton, (standing) Tennessee Corp., Atlanta, Ga.; R. E. Fraser, Summers Fertilizer Co., Baltimore Md.; C. A. Woodcock, St. Regis Sales Corp., New York.

Right Top Photo: P. M. Seaman, Jr., H. Kennington, Raymond Bag Co., Middletown, Ohio; F. Techter, Nitrogen Div., Allied Chemical & Dye Corp., New York, N. Y.; D. T. Fangmeyer, Mathieson Chemical Corp., Baltimore.

Right Bottom Photo: H. V. Cory, American Cyanamid Co., New York, and S. D. Preston, (seated) American Cyanamid Co., Winchester, Va.; W. E. Weems, American Cyanamid Co., Louisville, Ky.; Mrs. King; J. C. Bennett, American Cyanamid Co., New York, N. Y.; R. L. King, Georgia Fertilizer Co., Valdosta, Ga.



100 Years of Entomology . . .

PART II

CONTEMPORARY ENTOMOLOGISTS CONTINUE REVIEW OF THE PAST 100 YEARS OF DEVELOPMENT AND PROGRESS

Entomology and Public Health

By A. C. Bishopp

Pink Bollworm Research Project
Brownsville, Texas

THOUSANDS of people were dying, often unattended and frequently in the street; others were rushing out of the city in utter consternation. Many doors were marked with a terrifying red cross and "Lord have mercy upon us". This depressing scene was in London in 1665 during an epidemic of black death and before scientists determined in 1898 that bubonic plague was carried by fleas from rat to rat, and later to man.

Determination that man is inoculated with the disease by fleas and the development of effective methods of destroying fleas, and especially their rat hosts, guaranteed freedom from repetition of such terrible scenes.

Although some cases of plague still appear in various parts of the world, a few even in the United States, the knowledge contributed by medical entomology and related sciences makes certain that never again will the world be visited by a pandemic of this disease which in the 14th century killed 25 million people or one fourth of the population of Europe.

Yellow fever is another disease, outbreaks of which demoralized populations much as did the occurrence of plague. The mortality was high and the bewildering appearance and spread of the disease could not be explained.

Serious outbreaks of the disease had occurred in Boston and New York in the 1600's and in New York periodically down to 1856. Philadelphia suffered the most severe outbreak in 1793 when one tenth of the population died of the disease. The people of the Southern States, particularly in the cities, were constantly in fear of the malady and numerous outbreaks occurred, the last of which was in 1905. Reed and Carroll, of the famed Army Commission on yellow fever, estimated that during the period, 1793 to 1900, there had been at least a half million cases in the United States.

The outbreaks and the suffering and demoralization attending them largely ceased with the determination in 1900 by Major Walter Reed and his associates that a common house mosquito was solely responsible for the transmission of the disease. That discovery showed the necessity for protecting fever patients from mosquitoes and of controlling or eradicating the species responsible for transmission.

The practicability of completely eliminating the yellow fever mosquito from countries in their entirety was demonstrated by Dr. Fred Soper in Brazil. In the last few years most of the Republics of South America eradicated the yellow fever mosquito and with it the disease except in restricted jungle areas.

Probably no line of human endeavor has yielded in a short time greater benefits to man than has medical entomology in malaria control. A considerable percentage of the people of the world for centuries have been carrying the burden of malaria. The discovery in 1897 of the development of malaria organisms in a "dapple-winged mosquito" by Sir Ronald Ross and subsequent clear-cut proof that dapple-winged (*Anopheles*) mosquitoes were the sole transmitters of malaria from one person to another was the first important contribution of entomology to the solution of this weighty problem.

Although much of the subsequent extensive work on the problem supplied valuable fundamental information and demonstrated the value of water control to check breeding and of various means of destroying the insects or protecting man from their attack, it was not until the discovery of the effectiveness of DDT and related compounds as residual insecticides that the practical control of malaria on a world basis became a reality. The need for such a control method is evident when we consider that a decade ago there were probably 300 million cases of malaria in the world each year.

A few years back it was established that there were 6 million cases of malaria annually in the United

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R. L. Metcalf

States. Now there are no more than a few dozen and these are mostly acquired elsewhere. In 1924 The League of Nations Malaria Commission established that 1/3 of the population of ancient Greece, or about 2 million, were infected. Today, through mosquito control, malaria cases have been reduced to less than 50,000. There were 411,600 cases of malaria in Italy in 1945 whereas during the first half of 1951 this number was reduced to 392.

Substantial progress in malaria control is being made in many quarters of the globe. In several countries in Africa the morbidity and mortality from malaria are being materially reduced. In India where Ross estimated in 1910 there were 226 million cases and 1,130,000 deaths from malaria, organized mosquito control is now giving protection to many millions of the population. Similar work is going forward in Thailand and other parts of Indonesia, in Pakistan, and many countries in the Near East. Malaria control in an area invariably increases food production and improves the general economic situation there. This, in turn, improves public health in general.

Encephalitis or sleeping sickness of several types carried by a number of different kinds of mosquitoes is, with little doubt, being held down by mosquito control. This is also true of filariasis, a wide spread mosquito-borne disease of the tropics.

Minute sandflies carry the dangerous verruga or Oroya fever which occurs in Peru, Ecuador, Bolivia and other South American countries. This group of insects also carry pappataci fever, sandfly fever, and kala azar in the Mediterranean region and in Asia. Studies of these insects and methods of their control have shown that they can be destroyed readily by spraying insecticides on their breeding places around houses, in caves, and other damp places. This operation is now giving protection to many people.

One of the most feared maladies of Africa, known as African sleeping sickness, is carried by tsetse flies. These insects not only carry sleeping sickness of man, but also diseases of livestock which are so deadly as largely to prevent the development of livestock industries in a number of areas in Africa. Extensive studies of the insects and methods of control have yielded procedures that can be relied upon to reduce materially the incidence of these diseases in both man and livestock.

Prior to application of control measures developed by entomologists houseflies played an important role in the infection of people with typhoid, dysentery, diarrhea, and other digestive diseases. Methods of preventing the breeding of these insects and of destroying them by means of traps, poison baits and sprays have gone a long way toward eliminating annoyance and the transmission of various diseases by insects.

Entomology has made notable contribution toward the reduction of a number of other diseases that are carried by insects, ticks and mites. These include Chagas' disease carried by kissing bugs, endemic typhus carried by fleas, eye diseases carried by gnats, myiasis caused by flies, Rocky Mountain spotted fever, relapsing fever and tularemia carried by ticks, scrub typhus, rickettsial pox and scabies caused by mites. Annoyance by insects has public health significance, and entomology has given the public much protection against seriously annoying pests.

The contributions of entomology to increased food production and protection through insect control also have an important bearing on public health.

Entomology has also played an important part in controlling one of the world's worst diseases, typhus, and its disgusting carrier, the body louse. Epidemic typhus has played an important role in the outcome of military campaigns and in the shaping of history since 1489-90 when the forces of Ferdinand and Isabella were struggling with the Moors for the possession of Granada. In this conflict typhus is credited with the death of 17,000 soldiers as compared with 3,000 killed by the Moors. On through the centuries untold suffering and millions of deaths are chargeable to typhus.

In the latter half of the 19th century the disease became less prevalent, but in Russia it persisted with about 90,000 cases per year. World War II gave opportunity for the smoldering disease to become a general conflagration. Fortunately, entomologists and medical men had developed effective methods for delousing prisoners and refugees and through strict enforcement of these procedures the disease did not gain access to the allied armies in western Europe or to the United States. Also, fortunately, in 1909 Charles Nicolle had proved that the disease was carried from man to man by the body louse.

The serious trouble started in November 1914 in Serbia which had been attacked and devastated by the Austrian Army. By April 1915 the disease reached the peak of its fury; 2,500 were admitted daily to military hospitals alone and in six months more than 150,000 people had died. During and immediately following the war the Soviet Republic, by conservative estimate, had more than 25 million cases, with from 2½ to 3 million deaths. The body louse is also a carrier of trench fever so troublesome in World War I, and a form of relapsing fever.

Knowledge of the body louse and the effective means of delousing by the use of insecticides should prevent the loss of a single life from typhus. In fact, it should enable man to free himself entirely of this disgusting parasite and the diseases it transmits.

It is heartening to realize that, despite international wars, intrigue, spying, suspicion and hatred, exchange of information on epidemic diseases and methods of controlling insect carriers of those diseases is going forward.

It is difficult to put the contributions of entomology to public health into dollars and cents, but it is evident that workers in the field of medical entomology during the last 100 years have made a monumental contribution to the health, happiness and economic welfare of the people of the world which should do much to improve international good will ★★

Golden Age of Entomology

By E. N. Cory
University of Maryland
College Park, Md.

WITH the appointment of Asa Fitch in New York and Townend Glover in Washington, in 1854, an era began that has witnessed a succession of the most brilliant entomologists the world has ever known and the development of economic or applied entomology on an official basis that put the United States in the forefront of plant and animal protection. This golden age continued for about 60 years. Sixty years is just an arbitrary term. Possibly a longer period might be designated, but it is necessary to have perspective. This means that we must set a deadline from which to view the scene. In the next 40 years there were many, now dead, who performed notable entomological services. To go beyond that period and mention the names of others, either living or those who have passed on recently, would necessitate in all fairness that a fairly extensive list should be named. Someone in the next 50 years will probably evaluate the work and accomplishments of the federal and state workers who followed this 60 year deadline.

This article concerns itself primarily with the economic aspects of government and state services in entomology, and thus we will only mention in passing a few of the notable taxonomists without whom the very basis of economic entomology would be invalid. In this period there were such men as LeConte, Horn, Scudder, Williston, Ashmead, Dyer, Banks and a host of others who did excellent taxonomic work.

After Townend Glover there was a succession of outstanding entomologists in the federal service. This list included J. H. Comstock, C. V. Riley, L. O. Howard and C. L. Marlatt. Their entomological and administrative services were supplemented by the excellent work of such individuals as H. G. Hubbard, F. M. Webster, A.S. Packard, A.L. Quaintance, D. W. Coquillet, Theodore Pergande, Amandus Schwartz and A. D. Hopkins.

J. H. Comstock succeeded C. V. Riley and in turn was succeeded by Riley. He served only briefly and returned to his teaching at Cornell. C. V. Riley has left us "Insect Life", which is almost as useful today as when it was first printed, and his notable Missouri reports. He was a man of great energy and a keen observer. His work for the federal government and in the employ of Missouri was outstanding. He served two years as an entomologist for Maryland and had as his assistant the well known zoologist R. S. Lull.

L. O. Howard had the vision of the prominent place that entomology should take in world affairs. Moreover, he had ability to select outstanding assistants and to appraise the need for and value of certain projects, particularly in the field of biological control and in medical entomology. In addition he had a warm personal interest in every worker with whom he was associated. This capacity made him a host of friends. He never forgot what each individual was doing and retained his keen interest in his achievements and in the achievements of entomology up to the time of his death.

C. L. Marlatt was without a doubt the best administrator the Bureau of Entomology ever had. He had a keen analytical mind, a thorough knowledge of entomology, gained from one of the pioneer teachers, E. A. Popenoe, and the ability to bring the needs of economic entomology to those in a position to grant the help needed, particularly his superiors and the members of the Congress of the United States. He had a wide acquaintance in official Washington and was the man who saw the necessity for the plant quarantine act of 1920 and had the ability and perseverance to secure the passage of that act by the Congress. He then organized and served as chairman of the Federal Horticultural Board.

Thus there were four men directing the destinies of what later became generally known as the Bureau of Entomology, and helping to develop the organization. In its service was an array of entomologists the equal of which has never been assembled elsewhere. They achieved a place in the sun for themselves and the Bureau.

Meanwhile the states were developing their own entomological services, starting with the appointment of Asa Fitch in New York. The record of his achievement and those of a succession of notable entomologists gives New York an enviable position among the states. Such men as J. A. Lintner, E. P. Felt, M. D. Slingerland and P. J. Parrott contributed each in his own way to the excellence of the work in New York. Massachusetts furnished the Fernalds, Charles H. and Henry T., who will be included in the golden age of teaching, W. E. Britton in Connecticut, W. LeBaron, B. J. Walsh, Cyrus Thomas and Stephen A. Forbes in Illinois, Lawrence Brunner in Nebraska, John B. Smith in New Jersey and Wilmon Newell in the South. It is not possible in this brief article to speak of the achievements of each one of these men, but they were all notable for their capacity for work and the excellence of their records and the achievements that they left during this golden age.

The record would not be complete without mention of the men in Canada who were pioneering entomology and making Canada an integral part of the notable prominence of North America in economic entomology. James Fletcher, William Saunders, C. J. S. Bethune, and Gordon Hewitt were the men, ably assisted by certain teachers who will be mentioned later, responsible for the

development of economic entomolgy in Canada.

These achievements would not have been possible had it not been for the inspiring teaching of certain individuals. The order in which these men are mentioned is purely fortuitous. Professor Comstock has been mentioned previously in the section on government service. He was an indefatigable entomologist. He, like most of the rest of the teachers, took a personal interest in every student, — and the man who could not gain inspiration and knowledge under any of the teachers that are to be mentioned didn't deserve the name of entomologist. J. A. Comstock has left a series of incomparable texts. H. A. Hagen was the teacher of Dr. Howard who was fond of relating Hagen's methods of teaching. When he had his water pipe going satisfactorily, he would call in his students, have them sit around him in his office and then he would say "now I will tell you some of the tings vat I know."

In Massachusetts the elder Fernald, Charles H. and his son Henry T. Fernald developed a long succession of notable entomologists. Some of them are included in this fragmentary tabulation. Henry T. Fernald was especially beloved by all his students. The third of the triumvirate and the only member still living is Herbert Osborn who taught at Ohio State University. Beloved by all, he has had a long productive life in research, and has been responsible for the teaching of many of our top entomologists.

In Kansas were two entomologists, E. A. Popenoe teaching at Kansas State Agricultural College and F. H. Snow at the University of Kansas, both notable teachers. On the west coast Vernon L. Kellog at Leland Stanford Jr. University and W. B. Herms, at the University of California contributed to the development of many entomologists. In Canada Lawson Ceasar and William Lochhead trained many students.★★

Evolution ot Commercial Pest Control

by J. J. David

Purdue University
Lafayette, Ind.

IT was nearly 100 years ago that Solomon Rose established a pest control business in Cincinnati, Ohio. There appear to have been earlier pest control operators in New York, but in general they dealt with rodents. David Rose, son of Solomon Rose, told me of the methods used in some of their early operations. For example, for bedbugs their equipment consisted of a container of kerosene and a feather. The operation consisted of dipping the feather in the kerosene and wetting the cracks and crevices of the bedstead. These early operations were crude and laborious, but when carefully done were effective.

For many years there was little progress, — little change. Exterminators, as they were commonly referred to, were given little credence by entomologists. The general science of economic entomology was gradually growing. Technically trained men gave little consideration or approval to those known as exterminators.

A national emergency developed which changed the whole picture and served to bring together a nucleus of firms engaged in pest control work. The necessity, under N.R.A. requirements, for preparing an industry code, must be underlined as the occasion for the birth of a recognizable pest control industry.

It is to the credit of those assembled pest control operators that the possibilities were recognized, and the opportunity improved, for the formation of a permanent organization. A group of operators had met in Cleveland during 1933, then adjourned to a meeting of a more inclusive group at Washington, D. C. There the National Association of Exterminators and Fumigators was formally organized. The substitution, in 1936, of the present name—National Pest Control Association, was something more than mere change of wording; it was evidence of an already broadened outlook, a step toward the goal of professional status.

In 1935, when the organization had their second annual meeting in Detroit, the writer attended as an observer. Entomologists were critical of the so-called "exterminators" but I attended to learn more about the "developing" industry. I found that those promoting the organization were substantial and qualified individuals and interested in promoting a reliable and ethical industry. This aroused my interest.

As a result, Purdue University, in 1937, provided the first pest control operators conference. Its success and potential value, resulted in the establishment of similar conferences in California for the west coast operators, at Louisiana State University for those in the South, at Massachusetts University for the eastern operators and at the University of Montreal for those in Canada. In addition to the regional conferences, there are some 33 state association meetings of one to three days dealing with business and technical problems. Furthermore, there are a number of cities which have local associations. These educational conferences, along with the establishment and growth of the National Pest Control Association under able leadership within the industry, were the impetus for the development of an industry of major importance in the field of pest control,

which promises to be of greater importance in years to come.

In years agone, structural pest control operators or exterminators have received their training through apprenticeship or by a procedure of "hit or miss." Recognizing the importance of an educational background, the industry is now demanding technically trained men and women. Because of this demand and request, Purdue University, and probably other institutions, have provided a special 4-year curriculum, giving students not only a well-organized program of education, but also a program of business courses which will give a good understanding and background of business procedures. Furthermore, seven new courses, in addition to those already available in the Entomology curriculum, give the graduate a good understanding of the technique of structural pest control, as well as practical experience in actual control operations.

With the unequalled development of new chemicals for pest control as well as new types of equipment for application during the past 15 years, the problem of pest control is increasingly complicated, requiring highly trained men. More and more the people are asking where they can have the work done, rather than how they can do it. (This in spite of the popular "you do it" programs we read so much about.) Thus the demand for trained men is increasing and there is a bright future for those with adequate training.

The National Pest Control Association, under the able leadership of the late William O. Buettner, has developed into an influential organization, with a rapidly increasing membership, and providing major service to its members, including technical releases, timely, new, and up-to-date information, as well as promoting the business phases of the industry. At present the N.P.C.A. membership exceeds 900 members representing 1300 offices and many thousand employees. The membership in 1933 was 158.

The Association has developed a code of ethics, which the membership is expected to follow. The code reads as follows:

Relation of Member to Public—The member in his advertisements or other solicitations of business shall not use tricky, fraudulent, or misleading wording or methods.

Relation of Member to Client—The member shall thoroughly analyze the requirements of his clients and shall conscientiously recommend the means best suited for the clients needs.

Professional Services—The member, upon accepting a contract or service agreement, shall render skilled, intelligent, and conscientious service.

Relation of Member to Competitor—The member shall not publicly criticize the business or private affairs of a competitor.

Relation of Member to Association—The member shall be loyal to the principles of his Association and active in its advancement.

Thus through education and organization an industry, in a comparatively few years, has become one of high ideals. To be sure, there are still many who may be unethical and unqualified. These are gradually being weeded out and we can look forward in the near future to an efficient, ethical, and a highly appreciated industry.

Certainly, the future is bright in commercial pest control for qualified persons who adopt and practice ethical procedures.★★

Entomology in Relation to Animal Production

by E. F. Knipling

U. S. D. A. Entomology Research Branch
Beltsville, Md.

CERTAIN insects and their allies, ticks and mites, through the ages have developed a mode of living whereby they depend on animals for their existence. We call them external parasites. Many of these pests, involving hundreds of species, live on domestic animals and constitute mass competitors for the meat, milk, eggs, fiber, and leather obtained from livestock and poultry.

These arthropod parasites vary in the injury they cause to the animal host. Some of them seriously affect the health of livestock and others cause death particularly through the transmission of diseases. Uncontrolled, these parasites are so serious that the production of livestock according to modern standards would not be profitable in many parts of the country.

The value of the methods that have been developed for controlling livestock pests cannot be precisely determined. It is safe to say, however, that they have meant billions of dollars to the economy of our nation. Probably few livestock growers and certainly the public in general cannot conceive what a century of progress in veterinary entomology has meant to the nation's economic welfare. For the last few decades we have seen the livestock industry grow and flourish in the United States, especially in the South. Many developments contributed to this progress, including better breeds, control of diseases, increased production of forage, and better balanced rations. These developments, however, would not have resulted in the profitable livestock economy we

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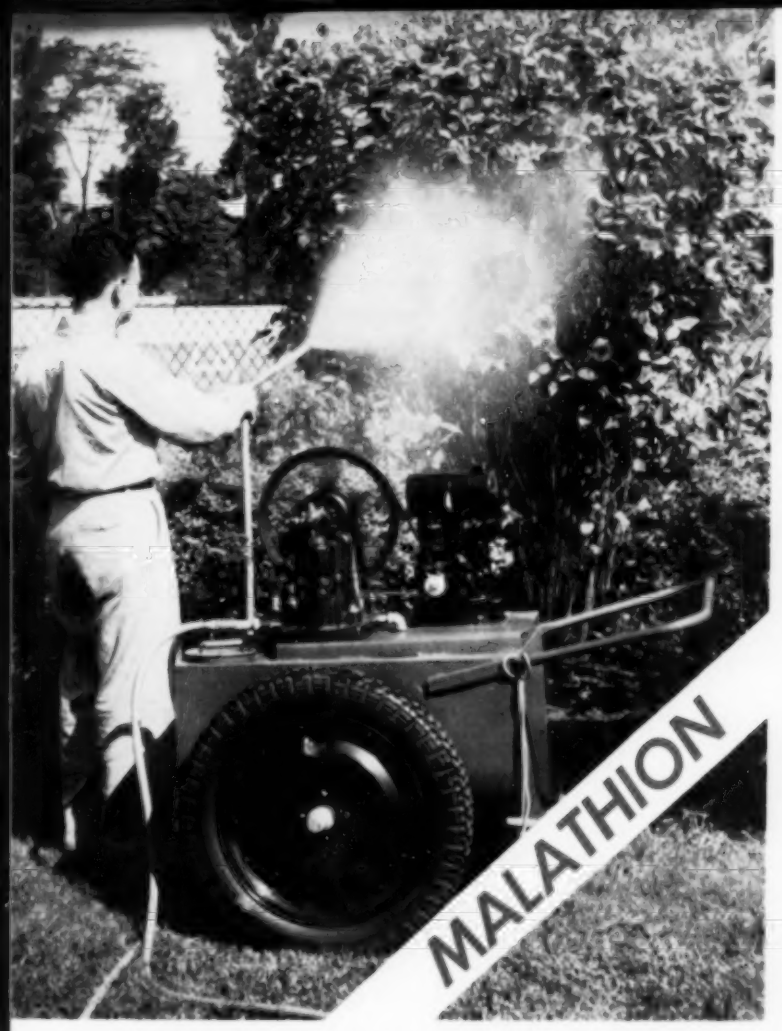

Cyanamid's Versatile Insecticide

By Richard G. Tousey
American Cyanamid Co.
New York, N. Y.

FIVE years of tests by State and Federal research workers are proving that malathion, the new phosphate insecticide, kills more species of insects on a wider range of crops than any previously developed insecticide in its mammalian toxicity range.

Malathion is the common name for the insecticidal chemical O-O-dimethyl dithiophosphate of diethyl mercaptosuccinate, which is now in volume production by American Cyanamid Co., New York. It has been accepted by the United States Department of Agriculture for control of more than 75 different insects on 30 or more crops.

One of the prime questions which must be answered for any phosphate base insecticide is that of hazard to warm blooded animals. Experimental toxicity data for malathion in relation to those of other commonly used insecticides are given in the accompanying table. (See Pg. 50) When examining the data it should be remembered that the *larger* the figures the *less* toxic the material to the test animals. In other words the animals could take larger doses without being affected.

As can be seen from the table, malathion is less toxic, both orally and absorbed through the skin, than DDT. The USDA issued a statement on malathion in which it was classed as "one of the safest insecticides to handle." Like all phosphate ester insecticides, however, malathion is a cholinesterase inhibitor, although a weak one, and prolonged or careless exposure may depress cholinesterase levels.

Other important questions which must be answered with any new insecticide are those of plant safety, residues, and possibility of off flavors in treated crops.

After exhaustive tests on practically all species of ornamentals, fruits and vegetables, the material has an exceptionally good record of plant safety. Considering the wide range of crops on which malathion has been tested, the few reported cases of plant injury present no barrier to general use. Wherever injury has been established, such information appears on labels. An interesting example of malathion's relatively non-phytotoxic properties is with the McIntosh apple. The McIntosh is extremely susceptible to injury from phosphate insecticides. This has presented special problems with parathion. Malathion wettable powders, however, in four years of use, have never given injury to this or any other apple variety.

Malathion residues on plants are lost very rapidly after application. For most crops, malathion residues are less than one part per million ten days after the last application. On leafy vegetable crops such as spinach and cabbage, the residues may exceed one part per million ten days after treatment, because of the larger surface area in relation to weight.

Panel taste tests with all forms of malathion (wettable powders,

Comparative Insecticide Toxicities

Compound	Acute oral Approx. LD50 mg/kg (rats)	Dermal (single exposure 24 hrs.) approx. LD50 mg/kg (rabbits)	Chronic Toxicity (rats) Time of Feeding-Weeks	Highest Dietary level without gross effects. PPM
Methoxychlor	6,000	2820 (30% Tech)	104	100
TDE (DDD)	3,400	1200	104	100
Malathion	1,845	MLD>6150	68	5,000
DDT	250	2820 (30% Tech)	104	50
Lindane	125	188 (2%)	104	50
Parathion	3	40-50 (Undil. Tech)	104	10
TEPP	1.2	5 (Undil. Tech)		

emulsifiable liquids and dusts) have produced no off-flavor reports which would limit its use.

What Insects Will Malathion Kill?

ORNAMENTALS — Malathion has given control of more ornamental pests than any other insecticide previously available for wide spread use in this field. Probably the only insecticide that will kill as many ornamental pests is parathion. The congested areas where much ornamental spraying must be done, and the precautionary measures necessary for its safe handling have limited parathion's usefulness in this field. Malathion fills a definite need, for it has been demonstrated to kill such a diversity of pests as aphids, mites, chewing insects, numerous scales, leafhoppers, lace bugs, mealybugs, and other insects too numerous to list. In 1953, the State of Massachusetts reported effective control of spruce mite for several weeks with one malathion application. New York State is recommending a "shot-gun" treatment of malathion plus DDT which they feel will take care of all normal insect infestations in only three applications—early May, early June and early July in both commercial and home garden plantings.

FRUIT — As a superior aphicide and acaracide, malathion is finding wide use in fruit protection. In addition, it is effective against many other fruit pests including pear psylla, Oriental fruit moth, eye spotted bud moth, codling moth and a wide range of scales on California citrus. It is being used widely against grape leaf hopper in areas where this insect has become resistant to DDT. It has also found a place in the protection of some specialized fruits such as cranberries, where application necessitates extensive human contact with the material, thus eliminating the more toxic compounds.

VEGETABLES — Again as a combination aphicide and acaracide, malathion fits immediately into the vegetable spray program. Maryland, for example, is recommending it highly for pea aphid after outstanding research results. It also kills cabbage worms and is receiving enthusiastic acceptance for Mexican bean beetle. In a recent release, North Carolina describes it as "one of the best bean beetle killers that has ever come along."

FORAGE — Malathion has been tested extensively as part of the forage insect projects carried on by many State Colleges in the past few years. It has proved effective against aphids, mites and leafhoppers as well as Lygus bugs, and certain stages of the spittlebug and the alfalfa weevil.

FLIES — The problem of house fly resistance to the chlorinated hydrocarbons has been responsible for wide spread trials with malathion during the past two seasons. By late summer 1953 the material was accepted for labeling for use as a residual wall spray inside dairy barns. When used as directed, malathion gives residual kills of flies for periods up to three weeks. It is also highly effective against fly maggots. There are many indications that flies may not be able to build up resistance to the phosphate insecticides, or if such resistance occurs it will be slow to appear. Many more generations have been exposed to phosphates than it took to produce resistance to the chlorinated hydrocarbons without appreciable signs of the flies developing tolerance.

Malathion is not, as yet, labeled for use directly on animals. Research work is in progress, however, and very promising results are indicated on cattle lice, ticks, and grubs and on poultry lice and mites.

With its very wide range of effectiveness against insects, its low mammalian toxicity, rapidly disappearing residues, and high degree of plant safety, malathion is being referred to as "one of the most useful new insecticides." It is being merchandised nationally by all the major insecticide formulators and distributors — both for commercial agricultural use and in home garden lines. Although the majority of the formulations are of straight malathion, more and more combination insecticide-fungicide mixtures are appearing in which malathion is a principal ingredient, particularly in the home garden lines. ★★

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Coop Buys Plant

The Arkansas Farmers Food Co., Little Rock, which has sold its entire fertilizer output, valued at $12,500,000 annually, to the Arkansas Farmers Association since the plant was built in 1949, has terminated its contract for exclusive fertilizer sales, effective July 15.

The Plant Food Company's factory was built with $425,000 subscribed by Arkansas farmers, and an expansion program, completed only last month, increased the firm's assets to $1,540,000. The Arkansas Farmers Association is a group of 54 self-controlled county cooperatives operating 62 retail stores for its own members.

The fertilizer plant produces 50,000 tons of superphosphate annually, in addition to other commercial fertilizers to meet all formulas recommended.

Epps Elected President At Annual Meeting of Southern Control Officials

RESEARCH workers, manufacturers and Southern feed and fertilizer control officials took a close look at each other's problems during the Southern Control Officials' annual meeting in Oklahoma City, Okla, June 21 and 22. Research workers and educators in the field of feed and fertilizer use and development were among the speakers appearing on the program along with representatives of the two industries and leaders of the Officials' Association.

At the close of the convention, which will meet in New Orleans, Louisiana next year, E. A. Epps, Louisiana, was elected president, M. P. Etheredge, Mississippi, vice-president, and Bruce Poundstone, Kentucky, secretary-treasurer. Directors named to serve on the board with the retiring president, Parks A. Yeats, Oklahoma, were N. L. Franklin, Virginia, H. H. Hoffman, Florida, R. W. Ludwick, New Mexico.

Parks A. Yeats, retiring president reviewed the background and activities of the Association, and presented several suggestions on future work of the group, some of which follow:

"1. That our standards for special purpose mixed feeds be reviewed by all states in this Association with the idea of reducing them or making them more inclusive or otherwise change and improve them as needed.

2. That this Association review the most practical and economic methods to follow by which information on the distribution of feed and fertilizer can be collected, compiled, and disseminated in a more uniform way.

3. That this Association with the help of the industry and other agencies develop a uniform method of procedure by which deficiencies, violations, mislabeling, or whatever you choose to call them, can best be appraised, evaluated, and published.

4. A great contribution to agriculture could be made if a uniform plan were prepared and followed by which the results of feed and fertilizer control work each year, as well as information concerning the laws, were disseminated through the extension service, vocational agriculture, A. & M. Colleges, and other educational facilities."

The afternoon's session on June 21 saw attention focused on subjects applying to fertilizer. Dr. Randall Jones, Associate Dean and Director of Agriculture, Oklahoma A & M College, spoke on "Approved Ratios and Minimum Analysis Grades." Robert O. Woodward, Oklahoma A&M College Extension Agronomist, gave a review of "Fertilizer Usage in the Southwest," followed by a panel discussion on "How Can A Fertilizer Control Official Assist in Improving the Agricultural Program." Appearing on that panel were Maurice B. Rowe, supervisor of fertilizer inspection in Virginia, C. C. Crawford, Bartlesville, Oklahoma, fertilizer manufacturer, Byrle Killian, district supervisor of vocational agriculture in Oklahoma, and Harry James, Oklahoma county farm agent.

R. W. Ludwick, State College, New Mexico, introduced a display of inspectors' equipment and supplies used in several surrounding states. The banquet, the evening of June 21, was followed by the final day's program devoted to feeds.

Dr. Charles Norton, head of the Oklahoma A&M College, told the group as he spoke of dairy feed standards, milk replacer feeds and recent developments in dairy feeding, "studies in the use of feeds have reached the point where there is greater need for application of what is already known than there is for new developments in the field of research." A plea for uniformity of state regulations and more attention to maximum levels instead of minimum requirements for poultry feed was expressed by Dr. Rollin H. Thayer, Oklahoma A&M Poultry Department. Dr. O. B. Ross, representing a Salina, Kansas feed manufacturing firm, declared, "The job you have been doing has been beneficial to feed companies who are conscienciously trying to do the best possible job," and further, "The feed industry has 'come of age' and certain standards should be lifted." He predicted that keen competition in the industry during the next 20 years will eliminate concerns not trying to regard the needs of the farmer and rancher, regardless of feed standards that are in force.

Les E. Bopst, executive secretary of the Association of American Feed Control Officials, College Park, Maryland, devoted most of his time before the assembly to a question and answer period on labeling standards set up by the Association. During the meeting, the group visited the Oklahoma Department of Agriculture's new feed and fertilizer laboratory, located near the Capitol. Some of the convention guests visited the Oklahoma A&M College campus after the close of the two-day meeting.

Newly elected officers of the Association of Southern Feed and Fertilizer Control Officials: (seated) M. P. Etheredge, vice president; E. A. Epps, president; B. Poundstone, secretary treasurer (Standing) N. L. Franklin, H. H. Hoffman, R. W. Ludwick, and P. A. Yeats, retiring president.

LISTENING
Post

Soil Treatment for Control of Potato Scab and Rhizoctonia

This department, which reviews current plant disease and insect control problems, is a regular monthly feature of AGRICULTURAL CHEMICALS. The comments on current plant disease problems are based on observations submitted by collaborators of the Plant Disease Survey Bureau of Plant Industry, Soils, and Agricultural Engineering, U. S. Department of Agriculture, Beltsville, Md.

By Paul R. Miller

W. J. Hooker of the Iowa Agricultural Experiment Station writes that while the use of fungicides applied to the soil for control of soilborne diseases in potato fields is relatively untried in the United States, pentachloronitrobenzene has been tested in Europe under the trade names "Brassicol", "Folosan", and "Bayer P" for controlling a number of soil fungi.

During the past two years, tests were made to determine the effectiveness of pentachloronitrobenzene in the peat soils of northern Iowa where the potato diseases, scab (*Streptomyces scabies*) and scurf (*Rhizoctonia solani*, were of greatest concern. Rather extensive trials had been made previously in these peat soils, using a wide range of materials of which sulfur was the most effective for reducing scab. The compounds of interest in the study reported herein were pentachloronitrobenzene, 20% dust, designated as M275, and two related chlorinated nitrobenzene compounds, M1197 and M273, all three prepared by the Mathieson Chemical Corp., Baltimore, Md.

In limited tests established in 1952 on a calcareous reed and sedge peat at Clear Lake, Iowa, M275 was sprinkled into the open furrow and mixed into the soil, and the furrow was closed. Rates of 100 and 200 lbs. per acre of 100% active material were relatively effective in reducing scab, and yields were not impaired. Because of the encouraging results in 1952, more extensive tests were made in 1953.

Broadcast trials were prepared by distributing chemicals by hand to 35 x 50 foot plots, arranged in a Latin square design. The material was disked thoroughly into the soil and whole B size Cobbler potato seed was planted the following day, May 8, 1953. M275 was applied at rates calculated to be 500 and 1000 lbs. of 100% active material per acre. As a control, ground sulfur, 80 percent of which was 65 mesh or smaller, was used at 4000 lbs. per acre, since this amount had been required for scab control in earlier trials on this field.

By the time the land could be fitted and the soil could be treated before planting, the period of low soil temperatures predisposing potato sprouts to early season *Rhizoctonia* infection was past. For this reason, subterranean stems were not examined until a month before normal maturity. At this time of the season, infection of stems by Rhizoctonia, the scab organism, and other soil fungi was advanced. Representative samples of stems were examined for infection by soilborne fungi and the extent of damage evaluated by rating each stem as: healthy, with no microscopically visible necrosis; slight infection, showing only a few cortical lesions with the majority of the stem clean; moderate infection; and severe infection, in which most of the cortical pathogens on potato stems (Table 1) were marked in the 500- and 1000-lb. rates of M275. Stems in the sulfur plots were as severely diseased as those in the untreated control plots. In Iowa peat soils, it is very unusual to find stems as bright and free and from necrosis as were obtained with broadcast pentachloronitrobenzene in these tests.

Potato yields were slightly but not significantly higher with pentachloronitrobenzene than in the untreated control. Yield increases following sulfur treatment were not obtained this season. This is in contrast to rather consistent yield increases

TABLE 1

Subterranean stem necrosis, soil reaction, and yields of Cobbler potatoes grown in peat soil treated as indicated, broadcast application, at Clear Lake, Iowa, 1953.

Chemical and rate	Necrosis of stems August 15					Soil reaction Sept. 15	Yield
	None	Slight	Moderate	Severe	Disease index		
Lbs./A.	%	%	%	%		pH	Bu./A.
None	5	2	82	11	66	5.6	378
Sulfur, 4000	5	6	74	15	66	3.2	372
Pentachloronitrobenzene, 500	20	3	73	4	53	5.5	415
Pentachloronitrobenzene, 1000	27	11	61	1	46	5.4	402

Total yield of tubers above 1⅞ inch size harvested at maturity September 15. Yield differences are not significant. Pentachloronitrobenzene, 100% active.

obtained in this same field with sulfur in previous years.

It is interesting to note that at harvest there was no appreciable change in soil pH folowing treatment with pentachloronitrobenzene, whereas sulfur induced a considerable reduction in soil pH levels. In rating incidence (Table 2), only deep 3 or 4 type scab was considered in the reading. Tubers with no scab lesions or with a trace of infection, i.e. only 1 or 2 lesions, would have made satisfactory grade as far as scab was concerned. Tubers rated moderate, i.e., 6 to 15 percent of the tuber surface with deep scab, would probably have been considered out of grade.

At the early harvest, scab incidence was approximately equal in the plots treated with sulfur and with the low rate of M275. At the normal harvest, M275 at 500 lbs. per acre was somewhat superior to the sulfur, and at the delayed harvest, differences were even greater. M275 at 1000 lbs. per acre was generally better than at the 500-lb. level.

The amount of russeting of the tuber surface (Table 2) was considerably higher in the untreated control than in the plots receiving either M275 or sulfur. Reduction in russeting of Cobbler tubers has previously been noted in these soils following sulfur treatment. Since a similar reduction in russeting was obtained with pentachloronitrobenzene, it is probable that the superficial shallow russeting of Cobbler tubers commonly obtained in Iowa peats is a mild type of scab infection. The amount of 3 type scab was not decidedly different when harvest was delayed one month past normal as compared to normal harvest, and the amount of russeting was approximately equal at those two harvest times. The greatest difference between normal and delayed harvest was in the incidence of *Rhizoctonia* sclerotia on tubers. At the early and normal harvests, sclerotia were respectively absent and very few in number, whereas at the delayed harvest, sclerotia were abundant on tubers from the untreated plots and rather common on tubers from

(*Turn To Page* 112)

TABLE 2

Incidence of scab, russeting, and sclerotia of *Rhizoctonia* on Cobbler tubers grown in soil treated as indicated, broadcast application, at Clear Lake, Iowa, 1953.

Chemical and rate	None	Scab incidence None and trace	Scab incidence None through moderate	Russeted tubers	Tubers with Rhizoctonia sclerotia
Lbs./A.	%	%	%	%	%
Early harvest, August 20					
None	3	26	72	—	—
Sulfur, 4000	27	70	94	—	—
Pentachloronitrobenzene, 500	28	67	96	—	—
Pentachloronitrobenzene, 1000	40	81	97	—	—
Normal harvest, September 15					
None	16	68	92	80	—
Sulfur, 4000	48	87	99	37	—
Pentachloronitrobenzene, 500	60	87	100	46	—
Pentachloronitrobenzene, 1000	83	96	100	18	—
Delayed harvest, October 10					
None	26	56	86	79	69
Sulfur, 4000	44	77	94	47	50
Pentachloronitrobenzene, 500	61	91	100	42	31
Pentachloronitrobenzene, 1000	56	80	96	30	21

TABLE 3

Yields and appearance of Cobbler tubers grown in treated peat soil, furrow application, at Clear Lake, Iowa, 1953.

Chemical and rate	Yield	Scab incidence None and trace	Scab incidence None through moderate	Russeted tubers	Tubers with Rhizoctonia sclerotia
Lbs./A.	Bu./A.	%	%	%	%
None	372	31	70	94	54	39
Sulfur, 500	446	49	81	97	30	16
Pentachloronitrobenzene, M275						
50	476	55	86	99	11	8
100	385	59	86	98	10	7
200	378	70	86	97	7	4
500	378	73	93	99	5	6
1000	366	80	94	99	2	5
2000	348	82	97	100	2	1
Chlorinated nitrobenzene, M1197						
20	409	33	73	95	35	23
50	354	39	65	92	31	24
100	324	46	74	99	20	17
200	269	39	72	97	25	11

Total yield of tubers above 1⅞ inch size harvested at maturity September 15. Least significant differences at 5 and 1 percent levels are 83 and 111 bu. per acre.

EVER MEET

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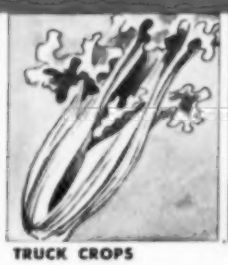

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Armyworm Outbreak Continuing; Orchard Mites, Aphids Increase

This column, reviewing current insect control programs, is a regular feature of AGRICULTURAL CHEMICALS. Mr. Dorward is head—Economic Insect Survey Section, Plant Pest Control Branch, U. S. Department of Agriculture, Washington. His observations are based on latest reports from collaborators in the U.S.D.A.'s pest surveys throughout the United States.

By Kelvin Dorward

Cereal and Forage Insects

THE armyworm outbreak which began in May continued in several states during June. In Kansas a serious outbreak occurred in the eastern part of the State with loss of grain heads reaching 60 percent in some fields. Many thousands of acres of wheat, barley and pastures received aerial application of insecticides. Serious infestations were reported from Missouri with the heaviest populations being in the Missouri Valley from Kansas City north and the Mississippi Valley from St. Louis to the Iowa line. In Indiana the infestation extended almost to the northern line, with head damage reaching 50 percent in some rye fields of the southwestern part of the State. Although heavy infestations developed in Tennessee, a wide spread control campaign helped to reduce losses in many areas.

Spittlebugs were beginning to be reported from several States by the middle of June. In eastern Illinois an average of 10 adults per sweep were taken in clover and alfala fields. Adults first emerged from alfalfa in the central Ohio area May 25 and were unusually abundant in Wisconsin meadows, strawberry plantings and hay fields. Adults were also numerous in various Maryland and Virginia counties.

Cutworms were also very important insects during June. In Montana, damage was reported from Musselshell and Chouteau counties. In sandy soil of Logan County, Nebraska area 30 percent or more damage resulted to corn. Populations up to 200 larvae per square foot were reported from some Kansas fields. In the northern third of Missouri, cutworms caused heavy damage to legumes but parasitism was rapidly developing. Although some replanting of corn has been necessary, damage was declining in Illinois by the middle of June but still a possibility in the northern part of the State. Other states reporting serious damage included Georgia, Mississippi, Tennessee, North Carolina and Indiana.

Boll Weevil Infestation Spotty

Although the boll weevil picture showed rather spotted populations in some sections, it approximated rather closely those of last year for the same period. Examination of 194 fields in 15 Delta Counties of Mississippi showed 99 infested with an average of 161 weevils per acre compared to an average of 152 in infested fields last year. In the northern areas of Louisiana, overwintered weevils were heavier than normal in many fields. However, in the southwestern part of the State, populations were very light. In Texas, infestations continued to increase in the lower Rio Grande Valley. Populations were light in the coastal areas, but overwintered adults were numerous in untreated fields of central, east, east central and northeast Texas.

In North Carolina, populations are expected to be below last year, while weevils found in trap plots of cotton at Florence, South Carolina were 69 as compared to 76 in 1953, 60 in 1952, one in 1951 and 3072 in 1950. Several south central Alabama counties showed unusually high populations, but southeastern counties were lighter, with emergence evidently slow. Large numbers of overwintering weevils were found in Arkansas fields located near good hibernating quarters, and weevils have been found in cotton in Caddo, Muskogee and Choctaw counties, Oklahoma. Injurious numbers of bollworms were found in scattered fields of the Lower Rio Grande Valley and southwest Texas during early June. Although present in the Yuma, Arizona, area, predators were keeping infestations at a low level. Heavy populations were recorded in some Arkansas cotton fields and for this time of year an unusually high number of eggs were present. By the middle of June, larvae had been reported from Pitt and Scotland Counties, North Carolina.

During June, thrips were of concern to cotton growers in several states. By the early part of the month, in the Rio Grande Valley of New Mexico as far as north as Socorro, populations had increased tremendously. In Graham and Cochise Counties, Arizona thrips were the principal cotton pests as was the case in Oklahoma and South Carolina. Injurious infestations in Texas were found from the central area northward. Aphids were the number-one cotton insect in New Mexico. Spider mites were already causing damage in some Arkansas counties, and cutworms damaged plantings in California and Georgia.

Orchard Mites and Aphids Increasing

Spider mites were building up on apple in Minnesota and at Vincennes, Indiana, around the middle of June. Virginia and Ohio reported serious infestations in some orchards. Rosy apple and apple aphids were showing rapid increase in Delaware and were extremely heavy on water sprouts in southern Pennsylvania. New Jersey reported increases of apple aphid in untreated apple orchards. Rosy aphid infestations have been particularly severe in the Kearneysville, West Virginia and Vincennes, Indiana area, as well as in Rockland County, New York.

(Turn To Page 107)

WASHINGTON *Report*

by
Donald G. Lerch
Cornwell, Inc., Washington, D. C.
(Agricultural Chemicals Washington Correspondent)

PRESIDENT Eisenhower's message of congratulation to entomologists adds further importance to the observance of this "century of progress". In his letter, addressed to David G. Hall, chairman of the Centennial Commemoration Committee, the President said: "I am happy to extend my congratulations to all members of the entomology profession as they celebrate the hundredth anniversary of their science.

"This occasion is a milestone in a record which includes scores of thrilling accomplishments in the control of destructive and disease-carrying insects. As a soldier in the field I saw first hand the remarkable achievements of entomologists in controlling insects carrying malaria, yellow fever, and typhus. Thanks to these scientists, such diseases are no longer the terrible killers of mankind that they once were.

"Today, as entomology enters its second century many challenges still face the members of your profession. In meeting these challenges, you have my wishes for success".

Numerous events are planned during the remainder of this year which will point up the big job facing entomologists. While no formal announcement has yet been made, several plans are under consideration, and it seems likely that The National Agricultural Chemicals Association will devote a part of its fall session to the Centennial.

With the plant investment of the fertilizer and pesticide industry increasing at an enormous pace, leaders are giving added attention to the job of selling. Higher investment calls for a steadily expanding overall market, as well as an advance in company sales.

In this respect, fertilizer manufacturers have been working hard at the job of selling, while the pesticide industry has been engaged primarily in bringing out new products and developing a healthy legislative climate for further growth. The bright sales record of the fertilizer industry has been credited in part to the active leadership of the two associations which are busy with round-the-clock activities to broaden the fertilizer market. This permits individual companies to compete for what they consider their share of that market.

As long as total sales climb, basic progress is being made, and company sales increases are not necessarily the sole result of their own aggressive salesmanship.

Pesticides can't be considered as a parallel, since historically sales reflect the severity and scope of insect and disease invasions. Yet, with the farmer laying out more hard cash for fertilizer, seed, machinery, gasoline, insurance, building maintenance, and the like, the practice of waiting till the bugs get their "half a loaf" before starting to fight seems to be an expensive tactic. Maybe some of the slide rule experts can come up with new ammunition in the form of figures showing that it pays to spray or dust most crops every year.

Until now, fertilizer sales have followed the curve of farm income. But now, after all these years, the curve has been broken. Farm income declined, but fertilizer sales climbed.

There is a long road ahead for pesticide manufacturers before they can anticipate duplicating such a performance in their industry, but even the longest journey begins with the first step. In this case it seems to be to keep emphasizing that regular use of pesticides is a practice that pays!

* * *

From Omaha comes a new story of how the fertilizer industry and agriculture help each other to the benefit of both. This latest development is centered in the big new nitrogen plant just a few miles from Omaha. Millions of dollars have been invested here, new jobs created, and agricultural needs for nitrogen well supplied,—chiefly because of the Nebraska sand hills!

Essentially, the hero is water. That's what the chemical plant needs . . . and it needs it in steady supply, all year round. In many areas, water supply fluctuates to such an extent that business management can't afford to take a chance. There is no sense investing money in what may be a "dry hole".

But the sand hills, under the management of conservation minded cattlemen, yield an even supply of clear, pure water the year round. This huge area, stretching for miles through central Nebraska, is kept in grass year after year. The grass catches the water, letting it sink into the soil instead of running off in a flash flood. As a result Nebraska streams and rivers have almost a constant rate of water flow, duplicated in but few other areas in the world.

That's why the chemical plant could be built near Omaha where it creates wealth two ways—jobs for people in town, and bigger yields for farmers. It's the kind of a cycle that makes prosperity—the real kind.

* * *

By proclamation, the President has set aside the last week of July as National Farm Safety Week. With current Congressional action in the pesticide field related largely to safety, it might be of interest to review the sources of farm accidents.

Actually, agriculture is an extremely dangerous occupation when compared with other activities such as manufacturing, the service, trade, and utility industries. The number of fatal accidents to farm workers is greater than in any occupation in the United States.

According to the National Council, nearly one fifth of the fatal accidents involve wheel tractors. One third of the fatal tractor accidents reported involve young people. One case in ten was a child under 5.

Accidents caused by insecticides are extremely few. The USDA offers the following suggestions to users: "Modern insecticides are powerful. Read labels carefully and follow instructions to the letter".

Senate Holds Hearing on Miller Bill

HEARINGS were opened in the U. S. Senate, June 23, on the Miller-Aiken Bill designed to protect the public from indiscriminate use of chemicals and pesticides, — in what the sponsors of the measure (S. 2868) hoped would be the last step before its passage by the Senate. The House has already acted favorably on its bill (H.R. 7125).

Among witnesses appearing on the first day of the hearings were Rep. A. L. Miller, author of the House Bill, Sen. George D. Aiken, co-sponsor of the bill, and Lea S. Hitchner, executive secretary of the National Agricultural Chemicals Association. Rep. Miller observed that while producers and users of pesticides have been "quite careful to insure that products they market are not dangerous to public health," the fact remains that under existing regulations no tolerances need be established before a new pesticide can be marketed.

Sen. Aiken added his strong endorsement to the measure, saying "I know of no one against the bill—the pesticide industry is for it, the fruit growers are for it, the vegetable people want it, and it is in the public interest."

Mr. Hitchner described the measure as "definitely in the interest of the public health." "The farmer cannot function without the use of these materials," Mr. Hitchner testified in his appearance before the subcommittee. "We wish," he said, "to unqualifiedly endorse and respectfully request the passage of this legislation." Under existing legislation, he pointed out, the procedure prescribed for fixing tolerances on permitted residues of toxicants on fruits and vegetables has proved to be cumbersome and impracticable. The Miller-Aiken Bill is designed to remedy this situation by providing for a simpler, improved and more appropriate procedure for establishing tolerances.

He observed that "The procedure specified in H. R. 7125 and S. 2868 would enable the prompt and efficient establishment of appropriate tolerances for pesticide chemicals used in or on raw agricultural commodities. This would be to the advantage of all concerned with the use of pesticides. The food consumer would be protected against the unsafe use of pesticide chemicals in the food supply and the fears of some consumers in this regard would be allayed. Chemical manufacturers and governmental agencies which advise the grower on the use of pesticides, such as the U. S. Department of Agriculture and the Land-Grant Colleges, would have standards upon which to base recommendations to the grower on the use of these materials. The grower would be assured that he and the crops which he produced would be in compliance with the law, if he followed the recommendations of these agencies and of the manufacturer. The Department of Health, Education and Welfare would have definite standards to guide them in carrying out their enforcement responsibilities as regards a safe food supply under the Federal Food, Drug and Cosmetic Act."

Commenting on the necessity for use of pesticides by food growers, Mr. Hitchner stated that "the farmer cannot function without the use of these materials." Supporting this thesis of the necessity for the use of insecticides, weed killers and fungicides in the production of an adequate, wholesome and economical food supply, he cited the opinion of Dr. H. L. Haller, assistant director, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, who has stated: "Over one-half the commonly used foods grown in the United States require the use of pesticides."

He also quoted Dr. Fred C. Bishopp, recently retired as assistant chief of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture, who emphasized the importance of use of pesticides by stating: "An abundance of high quality food and fiber crops is absolutely dependent upon the use of a diversified group of insecticides . . . Without insecticides, vegetables, fruits, and cereals would be unmarketable even by low standards. Wormy apples, corn and cabbage, weevily cereals, and other infested foodstuffs, with the accompanying wastes of insects, would reach the market in condition unfit for human consumption. . . ."

Doctors W. Coda Martin, New York City; Robert Mobs, Aberdeen, North Carolina; and Morton S. Biskind, Westport, Connecticut, signed statements advocating further restrictions. Drs. Martin and Mobs appeared before the sub-committee in person to state their views.

The provision for payment of fees as advocated by the Food and Drug Administration is supported in the Senate.

Nitrogen Increases Forecast

A steady, but slower increase in consumption of nitrogen during 1954-57 was predicted recently by a London Company. Aikman, Ltd., of London, in its semi-annual report on the nitrogen industry, said the consumption rise would not be at as fast a rate as the previous five years.

World use of nitrogen for fertilizers and industrial purposes will increase by 1,365,000 metric tons during the next three years according to the forecast, which was based on production outlook in the United States as well as in Europe, Egypt and other parts of the world.

Nitrogen production in the U. S. will total 2,095,000 tons during 1953-54 for fertilizers and industrial purposes, the report estimated, with a probable boost in 1954-55 of an additional 400,000 metric tons.

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Protect cattle from fly nuisance. (Use conventional sprayers or new automatic sprayer shown above). Quick knockdown and quick kill—no buildup of immunity—and no toxic hazards to the cow or to the milk when you use Pyrenone.

Protect processed food in storage. Pyrenone Mill Sprays protect valuable food products against insect damage. Safe to use—can be sprayed directly onto sacks or boxes—economical and effective.

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PROTECTS FOOD FROM FARM TO FAMILY

Versatile Pyrenone is available in a wide range of combinations that meet all insecticide requirements. And Pyrenone is especially suitable to food processing plants because there are no toxic hazards to animals or humans.

You are probably already using Pyrenone in at least one application. Remember, Pyrenone is not just one insecticide, it's a family of insecticides with a formulation to meet any need. Use Pyrenone for all insect control problems. It's safe—it's effective—it's economical.

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Use Pyrenone in the home. Pets and children are safe when you use Pyrenone to kill insects in the home. Pyrenone helps keep insects down and health up.

Technical
SECTION

Ethylene Dibromide for Jap Beetle Control

A NEW method for destroying Jap beetle grubs in balled nursery stock has been approved for use under quarantine regulations by the U. S. Department of Agriculture. It consists of injecting an ethylene dibromide solution into the balls of soil around the plant roots. This treatment is simpler and less costly than other approved methods, but is just as effective. Plants given ethylene dibromide injections can now be certified as safe for shipment or sale outside infested areas under Japanese beetle quarantine regulations.

The new treatment was developed through cooperative investigations by the Agricultural Research Service and a number of commercial nurseries, assisted by state regulatory officials. It is now going into use in regulated areas under Japanese beetle quarantine, which include the States of Connecticut, Delaware, Maryland, Massachusetts, New Jersey, Pennsylvania, Rhode Island, the District of Columbia, and parts of Maine, New Hampshire, New York, North Carolina, Ohio, Vermont, Virginia and West Virginia.

The ethylene dibromide, which is used for the treatment, is a fumigant-type insecticide. Injected as a liquid, it evaporates on release into an insect-killing gas that fumigates the soil around plant roots. Any soil that is not excessively wet or dry may be treated. Soil balls of any size may be treated, and plants may be either wrapped or unwrapped.

As with other authorized treatments, plant quarantine inspectors must be present to observe the injections. Soil temperature must be at least as high as 45° F. during treatment, since the insecticide is not sufficiently active at lower temperatures.

After the plants are treated, they must be held for 3 days at or above 45° F. to make sure all grubs are killed. Following this 3-day holding period, if there is reasonable assurance that soil temperatures will not drop below 45° F. for the next 4 days, the plants may be released for sale or shipment as certified stock.

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"Maneb" Approved by ICPC

The word "maneb" has been selected as a coined name for the fungicidal chemical manganese ethylenebisdithiocarbamate. This name has been approved by the Interdepartmental Committee on Pest Control. The American Phytopathological Society, the American Chemical Society, and the American Medical Association are agreeable to its use. Approval of the name maneb implies that the name is available for free use in designating the pure chemical in question.

The Interdepartmental Committee on Pest Control reports the following information from the originator of the coined name, but takes no responsibility for the contents thereof.

Maneb has previously been known by its chemical name, manganese ethylenebisdithiocarbamate, and also as manganese EBD, MnEBD, and on occasion, as MEB. The name maneb refers to the pure chemical and a technical grade shall indicate the percentage of maneb present. A wettable powder formulation designated duPont "Manzate" fungicide containing 70 per cent maneb is commercially available. ("Manzate" is a registered duPont trademark.)

Maneb is used commercially for control of early blight and late blight of potatoes and tomatoes; tomato anthracnose, Septoria leaf spot and Gray leaf spot; celery early blight and late blight; leaf spot diseases of carrots, downy mildew, purple blotch, and blast of onions; grape black rot (Great Lakes States); and shot hole (Coryneum) fungus of almonds and peaches (California).

The acute oral toxicity of maneb is low. The approximate lethal dose (ALD) for technical manganese ethylenebisdithiocarbamate has been determined for rats and guinea pigs as 7500 mg./kg. body weight. Limited chronic feeding tests with rats as test animals indicate that maneb is also low in chronic toxicity.

In concentrations used for control of plant diseases maneb has been non-injurious to a wide variety of plants such as potatoes, tomatoes, celery, carrots, onions, beans, cabbage, sweet corn, spinach, almonds, apricots, blackberry, canistel, cranberry, blueberry, grape, peach, walnut, carnation, chrysanthemum, gladioli, rose, and snapdragon. Under certain conditions, and in some areas, formulations of maneb have caused some injury to tobacco seedlings, sour cherries, some cucurbit varieties and some apple varieties. Maneb has been evaluated for seed treatment of such crops as sugar beets and tomatoes, as a seed piece treatment for Irish potatoes and as a slip treatment for sweet potatoes with no reported injury to seedlings.

Maneb formulations have been found to be compatible with most of the commonly-used insecticides such as methoxychlor, DDT, organophosphorus compounds, rotenone, sulfur and pyrethrum. As with other wettable powders, care should be exercised when mixing maneb and certain oil emulsion concentrates in the spray tank.

Neutral diluents are preferred, alkaline or acidic materials may promote decomposition.

Maneb should not be allowed to become wet during storage; containers should be kept closed when not in use.

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DDT for Bollworms

Five large-scale insecticide experiments were conducted in southern Texas in 1952 to evaluate mixtures of DDT with other insecticides for the control of the pink bollworm, *Pectinophora gossypiella* (Saund.), and the boll weevil, *Anthonomous grandis* Boh. The insecticides used with DDT were EPN, dieldrin, BHC, or toxaphene. All the mixtures increased the yield of seed cotton, the higher increases resulting from control of the pink bollworm. The addition of dieldrin to DDT caused considerable increase in boll weevil control over that obtained with dieldrin alone. The addition of EPN to DDT increased pink bollworm control and gave satisfactory control of the boll weevil. G. L. Smith, C. A. Richmond, and L. W. Noble, *Journ. Econ. Ent.* 47, No. 1, pp. 177-178. (1954)

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Insecticides for Potato Beetle

The application rate for DDT of 1¼ pounds active ingredient per acre per application was not satisfactory in reducing flea beetle damage, although the 2 pound rate gave reasonably good control. Commercial applications of one of the new organic phosphorus insecticides have been satisfactory, but the substitution of such a compound for the third and sixth application of the standard DDT was not sufficient. Two new insecticides, dieldrin and heptachlor, used at a rate of ¾ pound per acre per application gave excellent control. G. G. Gould and L. L. McCrosky, *Jour. Econ. Ent.*, 47, No. 1, p. 190 (1954)

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Cabbage Maggot Control

Control of the cabbage maggot can be obtained by use of chlordane, aldrin, or heptachlor, according to Dr. J. Hawkins, Maine Agricultural Experiment Station, Orono, Me. He indicated that all of these insecticides are safe to use on plants in the cabbage family if used according to directions.

The maggots are especially abundant during wet seasons and it is essential that these plants be protected from the maggots in the seed beds as well as after setting in the field or garden. In case of severe infestation, Dr. Hawkins advises a seed bed application of insecticides, another at the time of setting, and a third during early growth to obtain satisfactory control. However, he says, if the plants are not infested in the seed bed, a single application of the insecticide will usually give satisfactory maggot control.

The following are suggested as correct amounts and methods of application for the insecticides:

Material	Actual material per acre	Method of application	Time of application
Heptachlor			
Emulsion or wettable powder	4 oz. to 6 gal. water	Dip	At transplanting
	4 oz. and sufficient water to wet furrow	Spray	At seeding
"	2 oz. 50 gal. water 200-300 gal.	Drench*	When transplanting
"	2½% dust, 28-40 lb.	Dust	Immediately after transplanting
Chlordane			
Emulsion or wettable powder	4 oz. 72-75% emulsion in 50 gal. water	Drench*	Apply in setting water or apply immediately after transplanting
"	10 oz. 40% wettable powder in 50 gal. water	Drench*	
	½ gal. 72-75% emulsion to 50 gal.	Dip	When setting in field
"	water 5% dust, 28 to 40 lb.	A puff at base of each plant	At planting time
Aldrin			
Emulsion	2 lb. per gal. 1½ gal. in 50 gal. water	Broadcast spray to seed bed	Before last harrowing before planting
"	½ to 1 qt. in 50 gal. water	Wet soil thoroughly at base of plants	Immediately after transplanting
"	1 to 2 qt. with enough water to wet	In furrow before closing	When seed is planted Additional second surface application may be needed
"	1 pt. per 50 gal. water (4-8 oz. of dilution per plant)	In transplant water or poured around base of plant	At time of transplanting

*¾ teacupful to each plant or in transplanting water.

Toxaphene for Spittle Bug Control

AERIAL applications of toxaphene have not resulted in consistently good results in spittlebug control. Experimental work at the Ohio Agricultural Experiment Station has revealed some of the causes of those ineffective results. In 1952 and 1953 ground applications of toxaphene or aerial applications of BHC were consistently better than aerial applications of toxaphene. Experiments measuring deposits of toxaphene on the upper and lower portions of red clover plants were conducted in 1953. The ground applications applied two and one half times as much material on the lower portion of the plants as was deposited by the aerial application, even though the total deposit was approximately the same. Lack of penetration of the foliage cover, even on plants as small as 8 inches tall, was apparently responsible for the poor performance of the aerially applied material. Laboratory experiments with BHC indicated that the vapor action of that insecticide would kill the insects. Toxaphene did not exhibit this action.

Two methods were tested in an effort to increase the effectiveness of toxaphene when applied by airplane. (1) The dosage of actual insecticide per acre was doubled. (2) The rate of spray material per acre was increased from 2 to 6 gallons. Neither method resulted in a significant increase in control.

BHC remains the best material for spittlebug control by aerial applications. Two new developments from research may prove to be of benefit to aerial applicators. The first concerns the development of granular type insecticides; the second concerns a new survey technique.

Certain insecticides on granular formulations showed promise for use in spittlebug control during 1953. Tests indicate that as little as 10 pounds of material may be used per acre. If this rate would prove effective in airplane application, the effective payload of present equipment could be increased greatly. Tests of this method of control are being conducted during 1954.

Based on paper by C. P. Weaver, Ohio Agricultural Experiment Station, at third annual Ohio-Indiana Agricultural Aviation Conference, February, 1954.

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Parathion Residues

The residual effectiveness of parathion on leaves of peach is less than 1 week. Residues on bark, however, remain effective for a much longer period, and residues lethal to San Jose scale and Forbes scale crawlers remain for at least 4 weeks after applications. M. C. Bobb, *Jour. Econ. Ent.* 47, No. 1, N. 190 (1954)

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Endothal as Desiccant

Chemical desiccation was an effective means of rapidly reducing the moisture content of the top growth of a legume seed crop to facilitate direct combining. The crops should be sprayed one to three days prior to expected harvest date, depending upon the chemical used, prevailing climatic conditions, and the height and density of the top growth. Action is more rapid and satisfactory when the stand is fairly open and direct.

There are significant differences in the extent and rapidity with which various chemicals will accomplish desiccation. Under the conditions of this experiment, Endothal was the most effective of the several desiccants tested. Oil-soluble Dinitro, the next most effective chemical, caused some discomfort to the combine operator when used on a field size area.

Desiccation or pre-harvest spraying should be of considerable value to the seed producer. It is not a cure-all and must be used with considerable care and judgment, at least until more information is availale.

Although there has been a very limited use of pre-harvest spraying in the Southeastern states, its acceptance in the seed producing areas of the West has been widespread for about two or three years. It is estimated that more than one-quarter of the 24 million pounds of alfalfa seed produced in California in 1951 was successfully harvested by this method.

As previously indicated, the present investigation was confined primarily to small plots. Only exploratory tests were made on a field size area and subsequently combined. L. N. Wise, *Miss Farm Research*, May 1954.

This article is based on research conducted by Mr. Olen D. Curtis, former graduate assistant, and reported in his thesis submitted in partial fulfillment of the requirements for the Master of Science degree at Mississippi State College.

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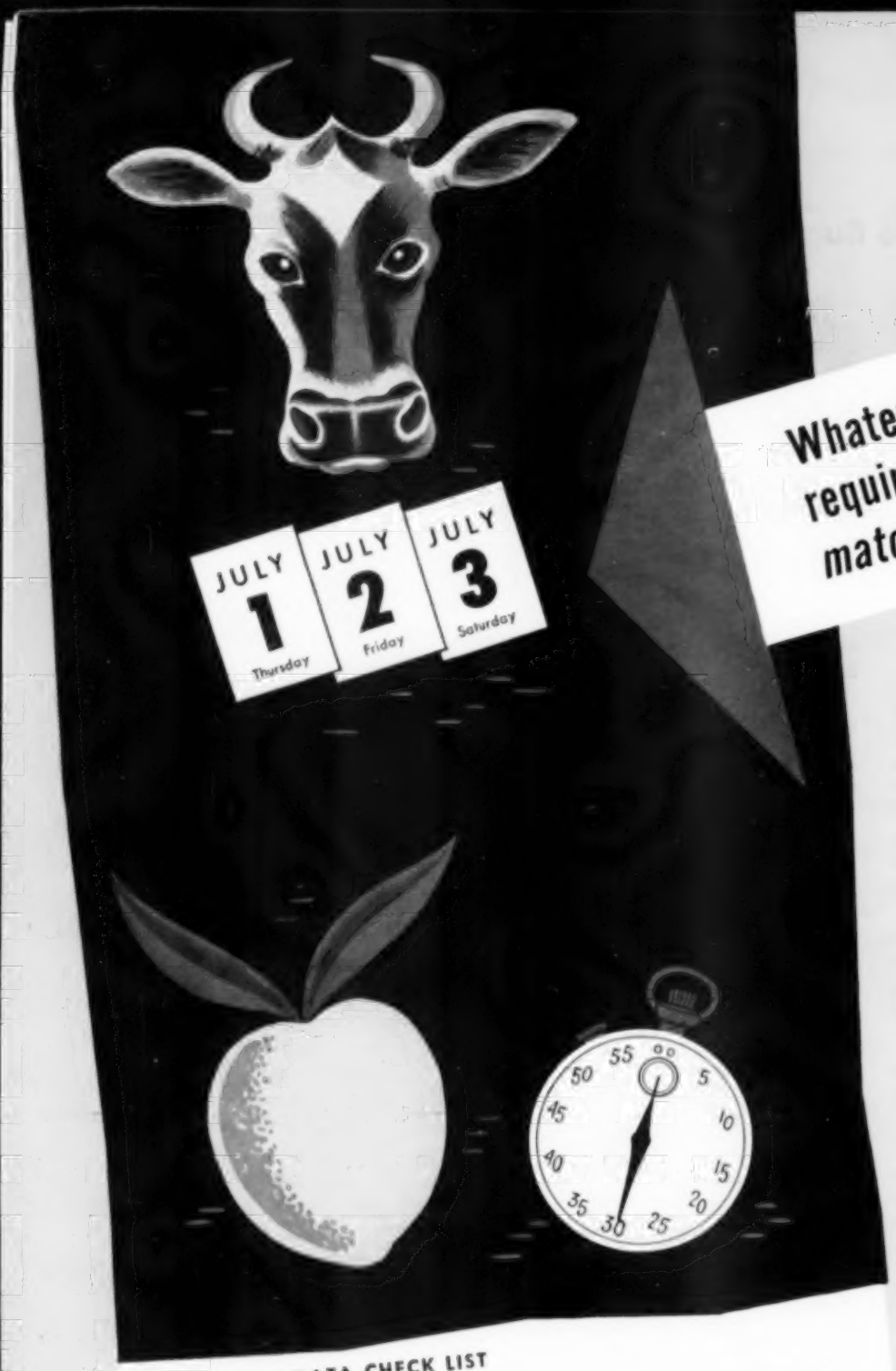
Fungicide Studies Reported

Recent reports on disease control work have supplied a number of new testimonials on the effectiveness of the dithiocarbamate fungicides. In Rio Grande Valley of Texas, dusting programs using eight per cent formulations of either "Parzate" or "Manzate" fungicides doubled spinach yields through control of white rust and blue mold. In South Carolina, six or eight per cent "Manzate" dusts at five-day intervals gave the best control of cucumber diseases of any fungicide tested for the third consecutive year. In North Carolina, use of either nabam or zineb was found to control scab of summer squash. At Oregon Experiment Station, Dr. E. K. Vaughan has found that ferbam at the rate of 1½ pounds per 100 gallons of water gave good control of blackberry rust. In the middle-Atlantic states, "Zerlate" fungicide at the rate of three pounds per 100 gallons (300 gallons per acre) has been recommended for the control of mummy berry on blueberries. L. O. Weaver of the University of Maryland says zineb gives good control of sooty blotch and frog-eye spot of apples, and may also be of some value against fire blight.

In tests at New Mexico Experiment Station, "Parzate" fungicide seemed actually toxic to Mexican bean beetles. When it was incorporated in a rotenone dust at 10 per cent by weight, the rotenone could be decreased to as low as 0.1 per cent.



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3. For water hardness _____ ppm.
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One per cent parathion also afforded excellent control when it was used with "Parzate". *Agricultural News Letter* 22, No. 3., E. I. du Pont De Nemours & Co.

•

Okla. Control of Ragweed

Weed control is just as important as fertilization and legumes in improving Oklahoma pastures, farmers of that state are told by the Oklahoma experiment station's forage crops staff. Elimination of perennial ragweed on much of the state's native pastures would increase meadow grass and hay production upwards of 20 per cent, they claim. A once-over treatment with 2,4-D properly applied at the right time, a station report says, will practically eliminate the ragweed at a cost of less than $1 per acre.

Tests with 2.4-D were conducted at the station over a four-year period, and recommendations are made in Oklahoma Station Bulletin, No. B-369, "Controlling Perennial Ragweed To Make Better Pastures." Briefly the station recommends spraying at ½ to ¾ pound of 2,4-D per acre when weed plants are 4 to 6 inches high. In dry weather, or when plants are more mature, 1 lb. per acre is recommended.

•

Study of Off-flavor Tests

Purdue agricultural experiment station researchers conducted tests to determine the presence of residues or off-flavors in food items derived from insecticides used in treating the growing crops. A progress report, included in the station's latest annual review of its activities advises that samples of potatoes and sweet potatoes grown in soils treated with aldrin, dieldrin, chlordane, heptachlor and lindane were taste-tested by a class in food technology and no off-flavor was detected. Samples from the first four treatments were analyzed by manufacturers and residues, if any, were so small as to be negligible. Turnips and cabbage grown in chlordane- and heptachlor-treated soil had no trace of the chemicals in the plants.

Insecticides were applied to the foliage of many plants, but in most cases, no chemical residues were found on the edible portion of the crop. Cabbage and potatoes sprayed with chlordane showed no trace in the edible crop. Systox was sprayed on two crops and showed no residue on turnips harvested 14 days after the last treatment, and no appreciable residue on lima beans harvested 25 days after the last treatment.

Samples of peppermint oil from plants sprayed with DDT, aldrin, heptachlor and a phosphate insecticide were tested for odor and flavor by experts from two processors, and only that from the aldrin was inferior to that from untreated plants. Dr. George E. Gould of the station's entomology department, directed the tests.

•

Petrified Insects Found

This petrified midge is 25 million years old according to the Smithsonian Institute where it is under study. Actual length is one tenth of an inch.

A new look into the formative period of life on this planet is being made possible by the discovery of certain insect fossils by geological survey workers. The petrified remains of insects and mites which lived about 25 million years ago have been found recently. They are being recovered by the dozens from ancient lake bottoms under the Mohave Desert.

Dr. A. R. Palmer, survey paleontologist, working at the Smithsonian Institution's National Museum, dissolves the lake deposits in acid, which uncovers the ancient insects in near perfect states of preservation. Their tiny bodies have been turned into glass.

This find may be considered one of the major events in entomological history. Scientists have new clues of life in the Miocene geological period. This is the name given to the ages about midway between the appearance of so called modern forms of life and the atomic era.

Literature Available

The following list reviews a series of bulletins on fertilizer, insecticide and fungicide recommendations, controls, etc. For the most part, these bulletins and reports are prepared by the various state agricultural experiment stations, and copies may be obtained by writing directly to the respective stations.

NEW VARIETIES OF POTATOES RESISTANT TO LATE BLIGHT. Bull. No. 60-62. Inter-American Institute of Agricultural Sciences, Costa Rica.

NJ WEED SURVEY. Study of weed control in New Jersey reported in Circular #392, State of N. J., Dept. of Agric.

CHEMICAL CONTROL OF BRUSH IN OKLAHOMA By W. C. Elder. Report of chemicals studied and results, methods of applying chemicals, suggested concentrations and rates. Circ. M-242 Oklahoma Agric. Exp. Sta.

CONTROL OF PEACH INSECTS. By P. Garman, W. T. Brigham, and A. deCaprio, 66 pages. Review of various pests and suggested methods of control. Bull. 575, Conn. Agri. Exp. Sta.

NIACIN 44 pages. Physical and chemical characteristics of niacin, applications in enrichment of food products, pharmaceutical application, use in animal and plant nutrition, listing of analytical methods. 9 x 12, chrome-coated cover, booklet the Barrett Division, Allied Chemical & Dye Corp.

SAND AND GRAVEL IN MANAGEMENT OF SOME COARSE-TEXTURED SOILS by C. L. W. Swandson and A. Ritchie. Connecticut Agri. Exp. Sta., New Haven, Conn. Bull. 580, Jan. 1954.

SCALE INSECTS AND THEIR CONTROL by J. C. Schread. Control measures are reviewed for pests of trees, nursey and house plants. A brief description of the general appearance and habits of several species is given. Bull. 578 Connecticut Agri. Exp. Sta., New Haven, Conn., Feb., 1954.

TESTS OF AERIAL APPLICATIONS OF HERBICIDES ON POST OAK AND BLACK JACK BRUSH IN OKLAHOMA. Progress report by H. M. Elwell and W. C. Elder. Results of formulations of low volatile ester herbicides are given, compared with 2,4,5-T and 2,4-D. Circ. M-258 Oklahoma A & M College, Stillwater, Okla.

TRANSACTIONS OF THE ILLINOIS STATE HORTICULTURAL SOCIETY AND THE ILLINOIS FRUIT COUNCIL for 1953. Proceedings of the 98th annual convention including reports on new developments in small fruit disease control; weed control on small fruits; an apple improvement program; effect of Captan on gray mold rot incidence and yield of strawberry; and experimental work with insect pests in 1953. Edited by H. J. Hartley, Published by the society.

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Pacific Branch E. S. A. Meets ...Urges Action on Miller Bill

Special report to
Agricultural Chemicals
By Charles Starker

ADOPTION of the Miller-Aiken bill to govern insecticides and set up workable means for establishing residue tolerances for insecticide materials was urged on government representatives, in a resolution passed by the membership of the Pacific Branch, Entomological Society of America, in business meeting at Bend, Oregon, June 24th. (See Pg. 93 for text of resolution.)

A total of 191 members and their families were registered for the three day meeting. Officers elected at the annual business meeting were: chairman, John D. Steinweden, State Department of Agriculture, Los Angeles; vice-chairman, Walter Carter, Pineapple Research Institute, Hawaii. Leslie M. Smith, University of California, Davis, will continue as secretary. Dr. Larry A. Carruth, Entomology Department, University of Arizona was named to fill the vacancy in the executive committee.

Paul O. Ritcher, Oregon State College, Corvallis, served as program chairman, with Robert D. Eichmann, Stauffer Chemical Company, North Portland, Oregon, as chairman of the Arrangements Committee, O. B. Hitchcock, U. S. Industrial Chemicals, Portland was in charge of registration and R. W. Every, Oregon State College, Corvallis, was Operations chairman.

An informal get-together was enjoyed by the group Monday night, June 21st, and 135 members were able to arise the next morning to attend the Buckaroo Breakfast put on by the Rim Rock Riders. A capacity crowd enjoyed the annual banquet at the Pilot Butte Inn and entertainment by the "Swiss Family Fraunfelder."

The 1955 meeting will be held in Riverside, California, with headquarters at the Mission Inn. The time will be during the third week of June.

Dr. E. F. Knipling, head, USDA Entomology Research Branch, Washington, D. C. was the first speaker on the 22nd, with an invitational paper on the reorganization of the Bureau of Entomology and Plant Quarantine. He told the group the old Bureau has been broken down into eight sections: Bee Culture and Biological Control; Fruit pests; Cereal and Forage Crops; Identification and Importation of parasites; Insecticides; Insects affecting Man and Animals; Truck Crop Pests. This splitting has caused some difficulties, with a definite loss in the separation of Forest Insect work from the Bureau. Stored Products Pests have also been placed in a section away from the Entomology Research Branch.

The changes made have brought some advantages. Certain of the research men now are able to work closer to the host crop research work, and enjoy better cooperation and coordination in special fields, with the leadership being excellent. Changes in the old bureau were mainly a top-level shift, Dr. Knipling indicated, with Federal-State relationships about the same.

Dr. H. H. Ross, president of the Entomological Society of America told the group a well-informed membership is essential for workers in the field. The association now has more than 3,000 members and it is hoped to raise that number to 4,000 before long. There is now a home office in Washington, D. C. to coordinate activities of the organization.

Dr. Ross stated the need for regional and national professional meetings is now greater than ever before. Better coordination between Entomology and related fields is needed: 1) The general education of the public on Insect problems and the mechanism of solving them, 2) definite professional standards for professional entomologists, 3) advisory action for legal bodies, which is a new endeavour.

"Some Historical Aspects of Pacific Coast Entomology" was the title of the invitational paper by Prof. E. O. Essig, University of California,

Left Photo (L to R): Roy Campbell, USDA, Whittier, Calif; John B. Steinweden, State Department of Agriculture, Los Angeles, chairman-elect for 1955.

Center Photo: Officers and Executive Board, Pacific Branch, (L to R): Leslie M. Smith, University of California, Davis—secretary-treasurer; J. F. Kagy, Dow Chemical Co., Seal Beach, Calif.; Walter Carter, Pineapple Research Institute, Hawaii; Stanley B. Freeborn, University of California, Davis—chairman; John B. Steinweden, State Department of Agriculture, Los Angeles—vice-chairman (chairman elect for 1955); R. D. Eichman, Stauffer Chemical, North Portland, Oregon.

Right Photo (L to R): Dr. H. H. Ross, president ESA; Dr. Stanley Freeborn, chairman, Pacific Branch, ESA

Presentation of certificates and pins for 40 years federal service in entomology to E. J. Newcomer, (left) USDA, Yakima, Wash. and Roy Campbell, USDA, Whittier, Calif. Dr. E. F. Knipling, Entomology Research Branch, makes the presentation.

Berkeley. He outlined the beginnings of Entomology on the west coast, mentioning early collectors and workers in the field of insecticides, and covering the period from early up to the present days.

Persian Problems

LOCUSTS are rather a minor pest in Iran, compared to other insect problems, Dr. B. G. Thompson, Oregon State College, Corvallis, told the group. Wheat is the number one crop, and the Sandpest (a pentatomid) cuts yields an average of 20% every year. At least six different species of scales were noted on citrus. Migratory locusts are also quite a problem, and during the period 1951-53 the worst infestation in 300 years occurred. One species of migratory locust found there is able to produce five generations per year under favorable conditions.

Control measures set up in 1952 for the application of poison bait were most effective. Spot spray applications of insecticides by plane were used to wipe out small infestations which showed up in any area missed by the baiting.

Entomology in the Twenties

THIS panel was moderated by T. R. Chamberlin, USDA retired. L. P. Rockwood, USDA, retired, Forest Grove, discussed his work on cereal and forage pests in the Northwest. Little entomological work had been done in the northwest and their job was of a pioneering nature. It was during this period that the alfalfa weevil, lesser clover leaf weevil, wheat midge, wheat joint worm, hairy vetch weevil, and omniverous leaf tyer arrived.

A good share of their work was on bionomics of pests, very little work with chemicals, and with a major emphasis on good farming practices. Taxonomic principles were also needed, for they had to be sure they were working on the right pest. Workers were forced to do more basic studies on pests because very few effective chemicals were available. Grasshopper baits as then mixed were quite primitive and uneconomical and little was known as to the best method of application.

Roy Childs, former superintendent, Hood River Experiment Station, commenced his work in that area some 40 years ago. At that time codling moth was their chief problem and they continued to battle it right up until they got DDT. Local disease problems in orchard areas stimulated development of work on the compatability of insecticide-fungicide mixtures. In 1919 perennial canker was very bad. The parasite *Aphelinus mali* was introduced to control the woolly apple aphis, chief vector of perennial canker organism. Spread of the canker was kept to a low level until introduction of DDT. At the present time it appears that *Aphelinus* is building up a resistance to DDT.

Dr. R. L. Webster, formerly head of the Entomology Dept., Washington State College, discussed the spread of tuber flea beetle and the pea moth in Washington.

Dr. H. A. Scullen, Oregon State College, retired, reviewed his work on the taxonomy of Hymenoptera in Oregon, his work on pollinators and solitary and native bumble bees.

Mr. W. W. Yates outlined his work with the USDA mosquito control work, both in Portland and when the laboratory was moved to Corvallis and livestock ecto-parasite work was added.

Spruce Budworm Parasites

W. K. Coulter, Pacific Northwest Forest and Range Experiment Station, Portland, Oregon summarized the effects of spraying some 3,000,000 acres for spruce budworm control. While the incidence of parasites varied somewhat, checks three to four years after spraying indicated parasites were most abundant on sprayed areas, and survival of parasites after DDT spraying now gives better control of the bud moth than was formerly attained.

Soil Insecticide Treatments

EARLY troubles with arsenical residues led to current studies on soil residues of chlorinated compounds, E. C. Klostermeyer of the Irrigation Experiment Station, Prosser, Washington told the group. Their work was begun in 1949. DDT, BHC, lindane, chlordane and aldrin in the form of wettable powders were mixed with sand and tilled into the soil to a depth of six inches. The soil was virgin sandy loam, just plowed out of sagebrush.

Soil samples have been taken each year and insecticide residues analyzed. Best indicator plants have been Black Valentine beans and Abbruzzi rye. DDT at ten pounds technical per acre gave some depression of yield on beans; BHC at three pounds technical had no apparent effect on beans, but did have on other crops; on plots treated at 15 pound rates, no yields were produced. Chlordane gave some depression the first year, later on had no affect. Aldrin at three pounds gave no trouble, but at 60 lbs. showed consistent depression for four years. Severe depression still results 5 years after application of 119 pounds of technical DDT per acre. Their work indicates that certain materials are quite stable in the soil. The soil type affects crop response and effects show up most in soils low in organic matter.

Soil Insecticide Panel

SOIL insects can be of many types, moderator Harry Lange, Univ. of California, told the group: Persistent, such as wireworms; non-persistent—cutworms; and those which move in after the crop is planted, as does the seed-corn maggot. There are also some which feed on plant foliage and later go into the ground.

H. E. Morrison, Oregon State College, Corvallis, mentioned some of the most important soil pests—white grubs, Japanese beetle, wireworms, corn root worm, root maggots, carrot

rust fly, root weevils, flea beetles and false wire worms. Best methods of control are poison bait, milky disease and use of residual insecticides in the soil. Broadcast application is the type most widely used, although soil drenches are used in some areas for control of corn root worm.

J. C. Elmore, USDA Entomology Research Branch, Whittier, discussed use of seed coating and spray methods to give supplemental protection to the plant as it emerges. The material is sprayed in seed furrows as seed is dropped. Materials used have been lindane, dieldrin or aldrin. They have been used satisfactorily on beans, cucurbits and spinach, but always with a fungicide. Emulsive concentrates have given seed injury through penetration of the seed coat.

L. C. Glover, Shell Chemical Corp., San Francisco, covered soil insecticides and fumigants. Fumigants such as DD and EDB have been used extensively in California. Methyl bromide is also used under plastic covers. DDT at 10 to 20 lbs technical per acre is still the standard material for general broadcast use. In some areas it has given control of certain soil pests for a nine year period. Chlordane is also used extensively as a soil insecticide. Aldrin works in a manner opposite to that of DDT. Two to 5 pounds of technical per acre will give protection for a year, with longer periods of protection under certain situations. Heptachlor parallels aldrin closely, its chemical nature being very similar to aldrin, and the residual is about the same. Dieldrin requires less dosage per acre, but gives a better residual, but not equal to DDT. Lindane is still used as a soil insecticide, but has the unfortunate habit of affecting the flavor of certain crops. Isodrin, about equal to dieldrin in action, is not too readily available and is more expensive. Toxaphene is not used too much as a soil material, but 20 pounds technical gives a residual similar to that of dieldrin.

E. C. Klostermeyer, Irrigation Experiment Station, Prosser, in discussing problems caused by application of chemicals to the soil, mentioned depression of plant growth, interference with normal soil fauna and the influence of soil structure on plant growth depression. The amount of insecticide necessary for effective insect control may produce off-flavor and poor quality. These conditions are more often noted on root crops.

Results from application of soil insecticides to plants may also be favorable, H. E. Morrison, Oregon State College, stated. Plants can be stimulated and plant products produced of better quality than in the check. On the question of permanent contamination of soil by use of high dosages, Morrison is of the opinion that certain materials decline in the soil.

Aldrin is gone at the end of two years, but effective insect control in that same soil can be demonstrated by use of bioassay methods. In orchards there is the possibility of residue buildups. DDT has been found in some Northwest orchards at a level of 100 pounds technical per acre, but this is the highest level found in a considerable number sampled. This residue is found in the top three inches, down to depth of cultivation. There has been some loss of the chemical, but what remains apparently has no effect on the cover crop. DDT residues fall off rather rapidly in the first three years, and then level off. It is interesting to note also that when DDT first came out, growers used it in the same way as lead with three to

(*Turn to Page* 103)

Reading from top to bottom and left to right, first photo: Dr. Don Denning, Velsicol Corp., Berkeley; Dr. Rosmarie von Rumker, Chemagro Corp., N. Y.; Dr. Larry Carruth, University of Arizona.

Second Photo: Bill Ziegler, American Cyanamid Co., Seattle, Merritt Francies, Stauffer Chemical Co.; Mike Klaich, Stauffer Chemical Co., Mountain View, Calif.

Third Photo: Clay Shelton, Stauffer Chemical Co., Portland; Warren Newall, Naugatuck Div., U. S. Rubber Co., Portland; Paul Allen, Geigy Co., Fresno, Calif.

Fourth Photo: A. J. Walz, Parma Branch Experiment Station, University of Idaho, Parma, Idaho; Ken Maxwell, Monsanto Chemical Co., San Jose, Calif.

Fifth Photo: Charles Douchette, USDA, Sumner, Wash.; Al Ash, Pennsylvania Salt Mfg. Co., Tacoma, Wash.

Sixth Photo: Carl Tanner, California Spray Chemical Co., Portland; Lew Wallace, Branch Experiment Station, Milton-Freewater, Oregon; Don Berry, American Cyanamid Co., Salem, Ore.

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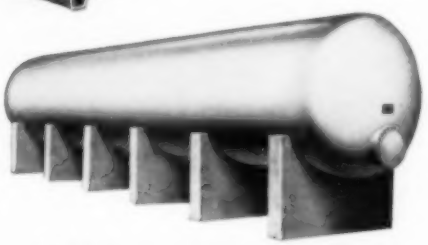

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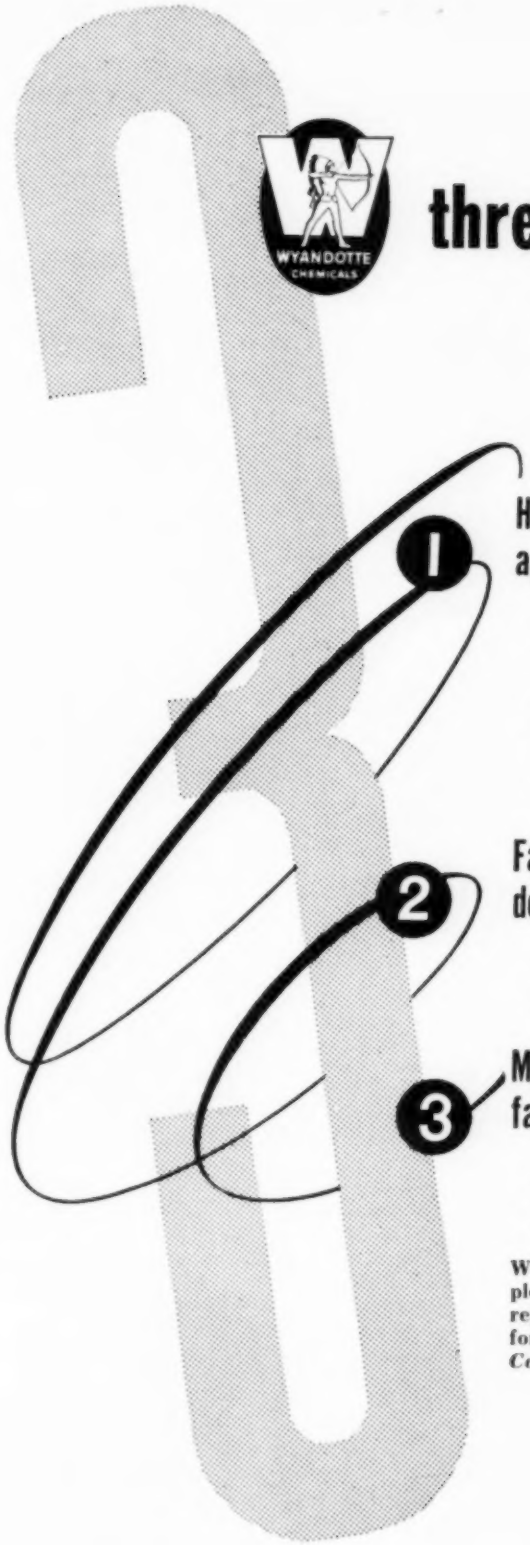

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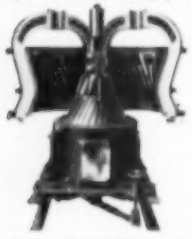

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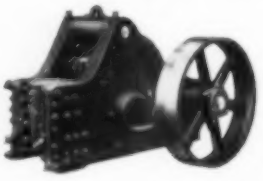

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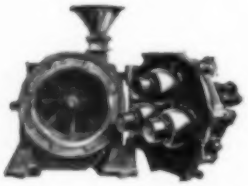

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New Premium Quality Phillips *66* Ammonium Sulfate is available *now!* It's *dry*-cured to remove excess moisture—prevent caking. Uniform, dust-free crystals flow freely—mix easily. Contains 21% nitrogen, ideal for all analyses of mixed goods and for direct application to all farm crops. Contact us now for your requirements.

2 ANHYDROUS AMMONIA

Tank car shipments of Anhydrous Ammonia (82% nitrogen) are assured to Phillips contract customers by Phillips huge production facilities in the Texas Panhandle and at Adams Terminal near Houston. Write our nearest Division Office for full information.

3 NITROGEN SOLUTIONS

Get more N per dollar! Phillips *66* Nitrogen Solutions are well suited to the preparation of high-analysis fertilizers and the ammoniation of superphosphate. These three nitrogen solutions keep handling costs low! Promote rapid, thorough curing!

4 AMMONIUM NITRATE

Phillips *66* Prilled Ammonium Nitrate contains 33% nitrogen. The small, coated prills or pellets resist caking . . . handle easily. Depend on Phillips *66* Prilled Ammonium Nitrate for uniform, free-flowing properties and top-notch crop response.

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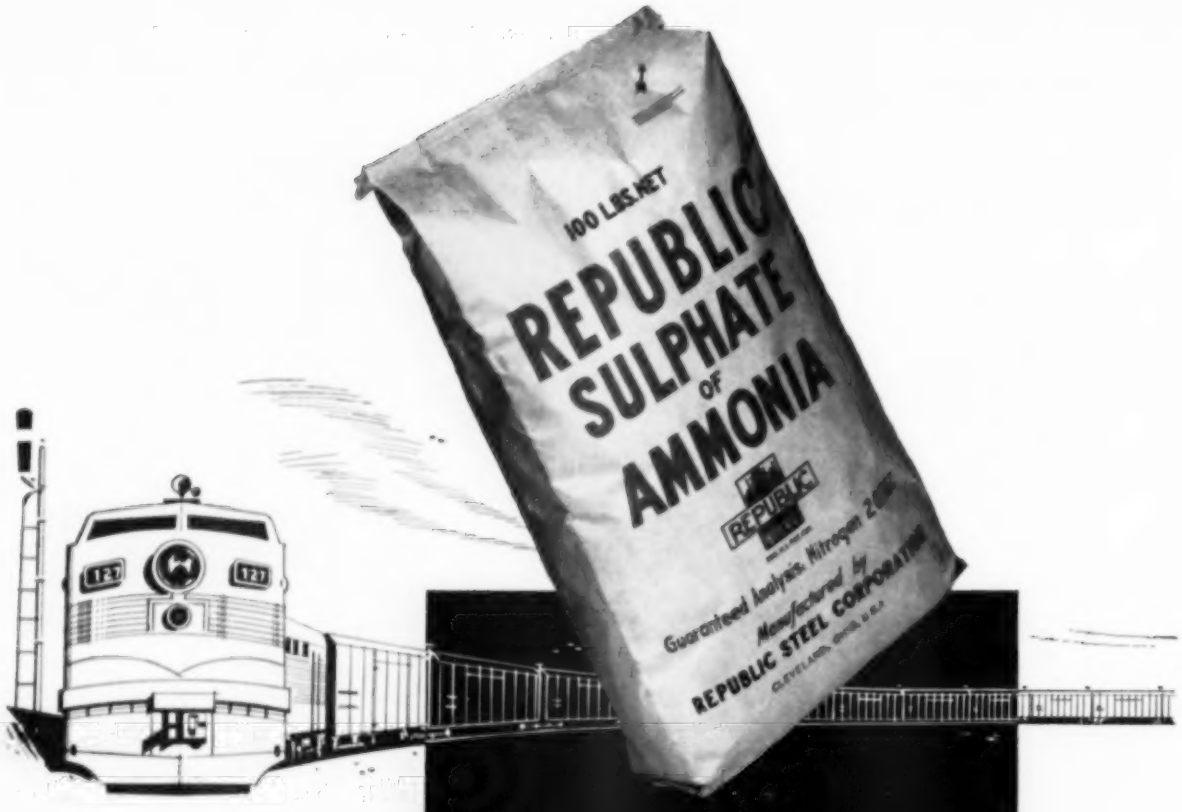

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Get ready for increased late-summer demand for NITROGEN

EACH year brings increased demand for nitrogen as more and more farmers come to appreciate the tremendous importance of this "growth element" to more efficient and better crop production. Tests are proving its profit-boosting value; agronomists and state universities are urging farmers to use adequate nitrogen on all crops. Last summer, those crops that were adequately fertilized with nitrogen showed greater yields and healthier plants despite the severe drought.

USS Ammonium Sulphate . . . better nitrogen for better yields

This form of nitrogen has proved itself a most dependable and popular source for both mixed fertilizer and direct application. For USS Ammonium Sulphate is a dry, free-flowing material that will not cake and clog equipment. It's an easy mixer. And, it's especially popular with farmers because it resists leaching and is available as the plants actually need it.

For sale as a direct application, USS Ammonium Sulphate comes in sturdy, moisture-proof 100-pound bags. There are numerous producing plants and sales offices conveniently located throughout the country. Check your stocks and be sure you've got enough to keep your dealers well supplied.

USS AMMONIUM SULPHATE

UNITED STATES STEEL

HANDLE PENCO DEFOLIANTS

FOR BETTER, MORE PROFITABLE COTTON HARVESTS

DE-FOL-ATE

The leader and commercially accepted chlorate type defoliant. Proven over and over again on hundreds of thousands of acres, De-Fol-Ate is dependable and fast acting. Growers will receive big dividends whether picking is done by machine or by hand. They will pick cotton with greatly reduced trash and lint stain—faster and easier.

De-Fol-Ate contains no boron compounds and dissolves in water in a matter of seconds and is, therefore, appealing to air applicators. De-Fol-Ate, a powdered material, is available in sturdy 100 pound fibre drums.

ENDOTHAL

Endothal, another PENCO product, has proven to be a highly efficient defoliant under favorable plant and weather conditions. In certain areas you will want to double check the advantages of this product. Endothal, a liquid easily mixed with water, is available in five gallon cans and 54 gallon drums.

You can recommend these Pennsalt defoliants for more efficient, more profitable harvesting. Service bulletins on these products are available on request from your nearest Pennsalt office. Write to Agricultural Chemicals, Pennsylvania Salt Manufacturing Company of Washington, Tacoma 1, Washington; Philadelphia 7, Pennsylvania; Bryan, Texas; Montgomery, Alabama; Portland, Oregon; Los Angeles and Berkeley, California.

Pennsalt Chemicals

De-Fol-Ate is a trade name of the Pennsylvania Salt Mfg. Co. of Washington. Endothal is the accepted generic name for 3,6-endoxohexahydrophthalic acid. The use and manufacture of endothal as a defoliant and herbicide are covered by one or more of the following U. S. Patents: 2,550,494; 2,576,080; 2,576,081; 2,576,083; other patents pending.

Spend ten dollars and make a hundred

Insecticide Manufacturers:

Now, more than ever before, it is important that cotton growers get maximum yield from each acre planted. That is why now is the time to impress upon them this elemental truth: "Spend ten dollars and make a hundred . . . use BHC."

It is sometimes difficult for cotton growers to recognize that such profitable opportunities exist through the high-yield, high-return practice of using BHC (benzene hexachloride) on their cotton crops. But the fact remains that, without such treatment, one bale out of every seven grown is still destroyed by cotton insects, notably the boll weevil.

The average yield of cotton per acre is 250 pounds. However, even when the yield is as much as 700 pounds per acre, proper insect control through the use of BHC has been known to increase this yield to 1200 pounds per acre.

BHC dust costs up to $10 per acre to apply, yet the careful grower can realize over $100 in return.

Urge your growers to use BHC for more cotton per acre, cheaper!

Columbia-Southern® supplies BHC, technical grade only, in 12% to 15% and 30% to 45% Gamma Isomer.

For further information, contact our nearest district office.

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INDUSTRY News

Stauffer Appoints Gunder

Roger W. Gunder is new western sales manager for Stauffer Chemical Co., T. A. Haschke, director of sales of the Industrial Chemicals Division, announced last month. Mr. Gunder formerly served as manager of the Los Angeles sales district. He has been with the company for 20 years.

•

S. C. Fertilizer Meeting

The South Carolina annual fertilizer meeting for fertilizer dealers, salesmen, and manufacturers will be held at Clemson College, Clemson, S. C., on Wednesday and Thursday, November 3, 4, 1954. A complete program will be furnished later. Hotel reservations should be made directly with the Clemson House, Clemson, S. C.

"FIGHT INSECT ENEMIES"

A nation-wide program stressing the insect problem is observed in the use of a postmark cancellation (illustrated below), using the "Fight Your Insect Enemies" slogan. In the photo, J. J. Davis, chief in entomology, Purdue Univ., at right, looks at one of the early "cancellations" in the Lafayette post office. F. C. Schneider, assistant postmaster, is shown with Mr. Davis.

Columbia To Build New Fertilizer Plant

A $12 million chemical and fertilizer plant will be constructed in the Pacific Northwest by Columbia River Chemicals, Inc., the company announced recently with the report that the Fluor Corp., Ltd., has been awarded a contract to design and construct the plant.

It will be located on a 50-acre site under lease from the Walla Walla Port Commission. The property is on the Columbia River, 28 miles from Walla Walla.

To be produced at the plant, first major project of its kind in the Northwest, will be 160 tons a day of anhydrous ammonia, 110 tons a day of urea and 140 tons a day of ammonium sulfate. Of this production, 110 tons of the anhydrous ammonia and 95 tons of urea will go into the agricultural market. The synthetic ammonia plant will be designed to generate hydrogen from bunker "C" fuel oil for combination with nitrogen from the air to produce the anhydrous ammonia. It will be designed to use natural gas as raw material when it is available in the area.

Columbia reports that the urea plant will be the first in the West. The ammonium sulfate plant will produce sulfate for fertilizer application. Construction of the plant is expected to be completed late in 1955.

Award to R. T. Cotton

Dr. Richard T. Cotton, noted entomologist, receives Distinguished Service Award from Secretary of Agriculture, Ezra Taft Benson. The award was presented "for outstanding world leadership in control of insects attacking stored grains and cereal products."

For the past 39 years, Dr. Cotton has been associated with the U.S. Department of Agriculture on various assignments having to do with insect pests of stored products. He discovered ethylene dichloride, carbon tetrachloride mixtures, ethylene oxide, and mixtures of carbon disulphide. He is the author of most of the American and much of the world literature on stored grain insects. His "Insect Pests of Stored Grain Products" is the standard textbook on the subject.

Since 1951, Dr. Cotton has been in charge of a unit of five U.S. Department of Agriculture field stations for research on stored-product insects—at Manhattan, Kansas; Houston, Texas; Fresno, California; Tifton, Georgia, and Richmond, Virginia. He is now located at Washington, D.C., where he is the technical advisor in the Stored-Products Insects Section of the Marketing Research Division, Agricultural Marketing Service, U.S. Department of Agriculture.

Fulton Names Merrill

L. H. MERRILL

Fulton Bag & Cotton Mills announces the appointment of Lewis H. Merrill as assistant manager of their New York office. Merrill, who formerly served as sales representative assumes his new duties immediately according to E. Monroe Hornsby, New York Manager for Fulton.

•

Cottonseed Crushers Meet

At the annual convention meeting of the Texas Cottonseed Crushers' Association, held June 15 in Houston, Tex., A. L. Duran, president of the National Cotton Council pointed out the vital role in the drive for bigger markets played by the cottonseed crushers. Mr. Durand pointed to mechanization, seed breeding, insect and weed control, defoliation and lint cleaning as special areas where crushers, in cooperation with the Cotton Council have helped to bring modern farming practices into wider use. Mr. Durand discussed also the part played by the crushers in the field of federally-sponsored agricultural research and extension, and reviewed various other activities of the cotton seed crushers and the National Cotton Council.

•

Monsanto Names Barbre

Clarence Barbre, general superintendent of production for Monsanto Chemical Co's William G. Krummrich plant, has been named technical adviser in the agricultural chemical field for Monsanto's Inorganic Chemicals Division development department.

Mr. Barbre will assist in the development of plans and programs for expansion of the division's activity in agricultural chemical fields.

•

Arkansas Aerial Spray Rules

Rules of the Arkansas Plant Board concerning the spraying of crops with 2,4-D and other hormone-type weed killers have been revised, following a public hearing early in June in Little Rock. The Board will no longer require publication of notices of intention to spray specific tracts, and it also has abolished the $100 performance bond formerly required of all custom sprayers.

Bond required of all sprayers who are to conduct airplane spraying operations within one and one-half miles of susceptible crops has been reduced from $100 to $50 per acre, but rigid enforcement of this provision will continue, Board officials said. Among the specific crops named are cotton, tomatoes, cucumbers, watermelons and other broadleaf crops, all of which are produced on an extensive commercial scale in Arkansas. The Board is now empowered to prohibit airplane spraying within three miles of a susceptible crop if conditions are deemed to warrant it.

•

New Ag. Plant in Mexicali

Opening of a new manufacturing plant in Mexicali, Baja California, Mexico, has been announced by Insecticidas Ortho, a Mexican agricultural chemicals firm with headquarters in Mexico City, and an affiliate of California Spray-Chemical Corp.

The new plant was scheduled to go into production June 10, and is a warehousing point and dust mill for manufacture of finished insecticides. A concrete building with steel frame, the new plant is so constructed that it can also incorporate facilities for spray manufacture.

Insecticidas Ortho officials point out that the Mexicali plant will be operated entirely by Mexican personnel, and is designed to serve Mexican agriculture.

•

Cyanamid Dedicates La. Plant

American Cyanamid Co., New York dedicated its new Fortier plant near New Orleans last month. The plant brings Cyanamid for the first time into the production of insecticides and other chemicals from natural gas.

Construction was begun in 1952. Production units currently in operation include sulfuric acid, oxygen and ammonium sulfate. Chemical Construction Corp., a unit of American Cyanamid Co., designed and built the plant.

P. ROSETTE

L. McGOUGH

Kapco Division of Summers

Philip P. Rosette, president of the Kelly Agricultural Products Co., announced last month the formation of his company as the Kapco Division of Summers Fertilizer Co., Inc., of Baltimore, Maryland. Operation of the new division is under the direct supervision of Mr. Rosette as general manager; Lloyd W. McGough is assistant manager.

General offices of the Kapco Division continue in McKeesport, Pa., where the firm originated in 1904 as the Kelly Seed Co. Manufacturing facilities will be expanded to permit wider distribution of fertilizers and insecticides in consumer and commercial markets.

•

Super PO_3 Output Up

Production of superphosphate in the U. S. totaled 227,383 short tons in March, the Bureau of Census reported, it was an increase of 14 per cent over March, 1953.

•

Diamond Announces Advances

Appointment of William H. Evans as a vice president of Diamond Alkali Co., Cleveland was announced in mid-June. At the same time, four other important promotions in the company's management organization were announced: John W. Mantz, assistant general manager of Diamond's Painesville plant since 1950, becomes general manager of the newly-created Silicate, Detergent, Calcium Division. L. T. Welshans, for the past seven years technical director of the Painesville plant technical staff, is named general manager of the newly-created Cement and Coke Division. C. R. Brown, manager of industrial relations at the Diamond Painesville Plant since 1950, moves up as assistant works manager, succeeding Mantz. Robert McConnell, who has been Brown's assistant, will become manager of industrial relations at Painesville.

•

Pacific NW Conf. to Ore.

A program of reports on soil testing and soil research, fertilizer testing and results, plant food requirements, etc. highlights the fifth annual

Pacific Northwest Fertilizer Conference to be held July 20-22 at Klamath Falls, Oregon. The meeting is sponsored by the Soil Improvement Committee and the Pacific Northwest Plant Food Association. The program includes the following reports:

"Soil Fertility Research in Oregon", by H. B. Cheney, Oregon State College, Corvallis, Ore.
"Fertilizer Testing Program in Idaho", by G. O. Baker, University of Idaho, Moscow, Idaho.
"Fertility Research on Grain in the Tulelake Area", by K. G. Baghott, Tulelake, Calif.
"Fertility Problems of the Klamath Basin," by A. R. Halvorson, Klamath Experimental Station.
"Some Potash Responses on Tree Fruits in the Medford Area", by G. Wickstrom and G. Braum, American Potash Institute.
"Boron Deficiency in Pear Orchards", by D. F. Allmendinger, V. L. Miller and F. Johnson, Western Washington Experiment Station, Puyallup.
"Fertilizer Responses on Grains and Grass Seed Crops in the Willamette Valley", by T. Jackson, Oregon State College, Corvallis, Ore.
"Range Fertilization", by A. G. Park, Balfour, Guthrie & Co., San Francisco.
"Gypsum in Pacific Northwest Agriculture", by J. E. Rinehart, U. S. Gypsum Co., Chicago.
"Principles and Practices of Plant Analysis in Crop Fertilization", by Albert Ulrich, Univ. of California, Berkeley.
"Where We Stand Today in Soil Testing" State Soil Testing Laboratories: L. Alban, Oregon State College; M. Reisenauer, Washington State College; and G. O. Baker, University of Idaho
"Soil Testing Round Table", H. B. Cheney, moderator.
"Nutrient Status of Potatoes by Leaf Tissue Analysis", by Harry Kittams, State College of Washington.
"Nutrient Status of Anjou Pear Leaves", by O. C. Compton, Oregon State College.
Field Trips to Tulana Farms, and to the Klamath Experiment Station.

•

Bagpak Buys APEX Stock

International Paper Co. New York announced last month the purchase of outstanding stock of American Paper Exports, Inc., (APEX), formerly held by several other paper companies. APEX has operated for many years as an export outlet for International Paper, and several other North American paper manufacturers. Its future operations will be integrated with the sales program of International Paper Co. APEX will continue to offer a full line of grades in its export marketing areas and to handle many grades produced by other manufacturers. I. C. Baldwin will continue as president of APEX.

Carbide Names Wellman

Dr. R. H. Wellman has been appointed assistant manager of the Fine Chemicals Department of Car-

bide and Carbon Chemicals Co., a Division of Union Carbide and Carbon Corp., New York.

Dr. Wellman has been the head of the Biological Research Division and will now be responsible for the sales and market development of the company's line of Crag agricultural chemicals. He previously directed the research and development work that resulted in such products as Crag Herbicide-1 and Crag Fruit Fungicide-341.

•

Ind. '52 Fert. Sales Up

Indiana farmers spent more for fertilizer in 1952 than in any previous year, according to the Purdue experiment station's report for 1953. From the tags sold it was estimated that 1,089,168 tons of fertilizer were sold in the Hoosier state that year. The average price paid per ton was $57.46 and total retail value of sales was $62,578,522. During the calendar year, the state chemists's office collected 3,095 official samples, representing one sample drawn from each 350 tons sold. Sixty per cent of the official samples met the guarantees in every respect, and 90 per cent of the samples were equal in value to the guarantee. There were, however, 281 shipments of deficient fertilizer, and on these refunds amounting to $5,894 were paid by 33 companies. Most of the deficiencies were found in mixed fertilizer and were about equally divided between potash and nitrogen.

Further examination of the report shows that sales of 3-12-12 were nearly 50 per cent of the tonnage. Other popular grades were 4-16-16, 10-10-10, 8-8-8, 3-9-18, 5-10-10 and 3-9-27. In 1946, it was recalled, sales of 2-12-6 led the list but in 1952 this dropped to less than 1 per cent of the total.

•

Horticultural Field Day

The first field day at the Horticultural Farm, Manhattan Kansas, since the 1951 flood was scheduled to be held June 28th. Included in the itinerary was inspection of an apple orchard where the Jonathan apple trees were sprayed with the antibiotics as an experimental control of fireblight. Other inspections included the vegetable investigations, the pruning study on watermelon, and sweet potato variety trial using 16 fertilizer treatments.

•

Floridin Moves Hdq.

Floridin Co. fullers earth, activated bauxite, and commercial adsorbent manufacturer, has announced the establishment of new executive and administrative offices at Tallahassee, Fla. Floridin, for the past 43 years, has maintained headquarters at Warren, Pa; a branch sales office will be maintained at that address.

The new general office building at Tallahassee was completed early in May, and administrative activities are currently being handled at that location. The new modern brick office structure is completely air conditioned, with adequate arrangements for future expansion.

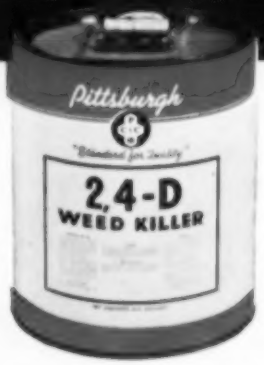
A new research and development laboratory, currently under construction at the same location, is expected to be ready for occupancy early in July. Considerable expansion of research activities in the development of new adsorbents and new uses for current products is planned.

The move of the administration offices and research and development laboratory is designed to result in a closer co-ordination between all branches of the company, necessitat-

Sell *Pittsburgh* 2,4-D WEED KILLERS

and you'll Sell More in '54!

FIELD-TESTED CHEMICALS
BACKED BY
AGGRESSIVE PROMOTION



Good 2,4-D sales! They can often brighten your entire farm chemical profit picture! That's why it will pay you to carry a good stock of *Pittsburgh* 2,4-D Weed Killers right through 1954. When you handle *Pittsburgh* 2,4-D, you have a solid, hard-working sales program backing you up every step of the way: (1) Quality-controlled chemicals and fast dependable deliveries because we're a *basic* producer. (2) Assured weed-killing performance in your customers' crops because *Pittsburgh* 2,4-D is *field-tested right in your area.* (3) A complete advertising program to promote your sales—including farm paper ads, literature, window streamers and newspaper mats. The result? Sell *Pittsburgh* 2,4-D and you're sure to "Sell More in '54!" Send for complete details now!

W&D 1030

Standard for Quality

ORGANIC INSECTICIDES: Benzene Hexachloride, Toxaphene, and DDT.

ORGANIC PHOSPHATE INSECTICIDES: Parathion Wettable Powders, Parathion Liquid Concentrate, Systox.

WEED KILLERS: 2,4-D Acid, 2,4-D Amine Concentrates, 2,4-D Ester Formulated Concentrates, D4 (Low Volatile 2,4-D Ester), C4 Pre-Emergence Weed Killer, 2,4,5-T Formulations.

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ed by the greatly increased sales volume achieved in the chemical industry. The Floridin Co. has fullers earth plants at Quincy and Jamieson, Florida, an activated bauxite plant at Sweet Home, Arkansas, and a synthetic adsorbent processing unit at Clarendon, Pennsylvania.

•

Ninol Expansion Underway

Ninol Laboratories, Chicago, announces completion of the first phase of its current building operations with full scale production of salt free sulfonates now under way at its new southside plant. The plant is one of the first in the country to produce specialty sulfonates from liquid sulfur trioxide—a process on which the firm has carried out extensive pioneering work over the past few years. Use of sulfur trioxide in place of the conventional oleum has the advantage of producing salt free sulfonates in a single step, eliminating the need for desalting operations procedures. Future plans include erection of additional manufacturing facilities and a modern laboratory and office building on the ten acre site.

•

McCormick Joins Hammond

H. S. McCormick has joined the general sales department at Wellsburg, W. Va., of the Hammond Bag & Paper Co. He was formerly with H. J. Baker & Bro., New York.

Hammond announced also the appointment of W. A. Sheets as a special sales representative in the Chicago area.

•

Du Pont Advances Three

Dr. A. E. Carlson has been appointed manager of agricultural chemical sales of the E. I. du Pont de Nemours & Co. Grasselli Chemical Dept., succeeding G. A. Wright, who was named Grasselli's New York district sales manager. E. J. Maguire, New York district sales manager since 1932, will act as a consultant until his retirement on June 30, after 44 years with Grasselli in New York.

Dr. Carlson was formerly assistant manager of agricultural sales, in charge of sales of weed and brush control chemicals.

Plant Requirements Discussed At California Conference

REPORTS dealing with phosphorus fertilization, specific fertilizer problems of vegetables, fruits, pasture, etc.; phosphate and phosphorus needs, and the broker's role in the fertilizer market, highlighted the second annual California Fertilizer Conference, held April 29-30 in Visalia, Calif. The meeting was sponsored jointly by the Soil Improvement Committee, California Fertilizer Association, and the Agricultural Extension Service, University of California.

In discussing the fertilization of deciduous fruits, J. H. Foott, Tulare County, Calif. observed that nitrogen is one of the prime requirements of this crop, suggesting the use of 80-100 pounds of actual nitrogen per acre. He suggested also that the grower use the test plot method of determining the phosphorus, potash and nitrogen requirements of his crop.

On the question of pasture fertilization, H. S. Etchegaray, Kings County, Calif., indicated that as far as sudan grass is concerned, nitrogen is one of the main requirements of this crop, seasonal needs amounting to about 150 pounds per acre.

Albert Ulrich and P. R. Stout, prepared a report on the availability of phosphorus to the plant and concluded that "correcting a phosphorus deficiency of a crop is largely dependent upon the soil phosphorus system in which the plant is growing. If the dominant system is the calcium-phosphate system, then adding enough phosphorus to the soil to meet the needs of the crop is usually an easy matter. If, however, the crop is growing on a kaolinitic soil, then for non-tree crops, large amounts of phosphorus fertilizers must be applied within the root zone to correct a phosphorus deficiency. Regardless of soil type, plant tissue analysis helps to disclose the phosphorus needs."

T. Embleton, Citrus Experiment Station, Riverside, Calif., outlined phosphorus fertilization of citrus in California, and emphasized the following points:

1. Phosphorus deficiency of citrus is not widespread in California.

2. Where phosphorus deficiency of citrus does occur, striking responses are obtained from soil applications of phosphates.

3. Soil and leaf analyses offer a good means of diagnosing phosphorus deficiency of citrus.

The broker's role in the phosphate picture was discussed by Ralph S. Waltz, Wilson & Geo. Meyer & Co., San Francisco.

Top Photo: (l. to r.) B. H. Jones, pres., CFA; Dr. W. H. Garman, agronomist, American Plant Food Council, Washington, D. C.; M. E. McCollam, chairman, Soil Improvement Committee, CFA.; Dr. W. E. Martin, Univ. of Calif., Berkeley; J. H. Nelson, conference chairman; and Robert Engle, agronomist, N.F.A., Washington, D. C.

Bottom Photo: (l. to r.) R. Waltz, Wilson & Geo. Meyer & Co., San Francisco; T. Embleton, Citrus Exp. Sta., Riverside; O. Lilleland, Univ. of Calif., Davis; O. A. Lorenz, Univ. of Calif., Davis; D. Mikkelson, and D. G. Aldrich, Jr.

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HANDBOOK OF PEST CONTROL

by Arnold Mallis

THE new HANDBOOK of PEST CONTROL by Arnold Mallis, a completely revised edition, is on the press and available for distribution.

▲ The new edition contains more than 200 illustrations—a much larger and more complete volume than the original HANDBOOK by Mallis, published in 1945 and out of print since 1948.

▲ This newest pest control reference volume deals primarily with household and industrial pests, insects, rodents, etc., their habits, identification, and latest methods of control. It is the most complete work of its kind ever offered in a single volume.

▲ Those who have used the original HANDBOOK by Mallis undoubtedly will want this new, up-to-date volume, a standard reference book which should be in the library of every pest control operator, insecticide manufacturer and marketer, entomologist, chemist and others interested in modern materials and methods of pest control.

▲ The new HANDBOOK of PEST CONTROL by Arnold Mallis measures six by nine inches, has a sturdy binding in green cloth, gold stamped. The book comprises twenty five chapters, running to a total of 1067 pages and is printed on durable, long-lasting paper.

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Arkell Names Jones

Tom Jones

Arkell and Smiths, appointed Tom L. Jones manager of fertilizer bag sales. Mr. Jones will continue in his present capacity as central division sales manager, with offices at Columbus, O.

•

Sterk Retires From du Pont

Edward F. Sterk, assistant to the agricultural chemicals sales manager of the Du Pont Co's Grasselli Chemicals Department, has retired after nearly 45 years with the department and its predecessor, the Grasselli Chemical Co.

Mr. Sterk has been asociated with sale of insecticides and fungicides throughout his business career. He joined the Grasselli Chemical Co. in New York as a stenographer in October, 1909, and was later advanced to salesman. He was appointed eastern sales manager for Grasselli agricultural chemicals in 1919.

•

MGCA Honor Monsanto

The Men's Garden Clubs of America awarded one of its highest honors early in June to Monsanto Chemical Co. of St. Louis, Mo., for the company's development of Krilium soil conditioner.

The award, made during the national gardening organization's annual five-day convention in Denver, was the first of its kind made to a commercial organization by the amateur gardening bod'.

The MGCA award was accepted on behalf of Monsanto by Howard A. Marple, director of advertising and public relations for the company.

•

Chemical Acquires G.L.F.

Chemical Enterprises, Inc., of New York announced early in June the addition of Gulf Liquid Fertilizer Co., of Wharton, Texas, to its companies in the agricultural chemical distribution field. With this acquisition, the group of Chemical Enterprises' subsidiaries comprises 12 companies operating in 16 states in the United States.

Gulf Liquid Fertilizer is a distributor of anhydrous ammonia. It will continue to operate as an independent unit under the same policy as in the past. J. K. Derden will continue as vice president and general manager.

Potash Man Honored

Dr. Niven D. Morgan, Southwest representative for the American Potash Institute, Washington D. C., has been honored with the award of master agronomist by the Oklahoma A. & M. College. The recognition, given specially by the agronomy department of the college, is accorded for outstanding achievement in the field of agronomy. This is the first year it has been extended to men in the commercial field.

AUTOMATION*

*the key to "Push Button Control" of DORR-DESIGNED PLANTS

Instrumentation . . . centralized control . . . completely automatic operation . . . no fertilizer plant can be completely efficient unless it employs these three principles. And that's what you get with *every* Dorr-designed plant. Its complete mechanization and simplified control bring to the industry new conceptions for ease of operation, high production, lower manufacturing costs and quality product control.

Illustrated above are typical "nerve centers" that centralize process control at various Dorr-designed fertilizer plants. Here's how *you* can benefit with automation . . . new plants go into commercial production faster . . . you have complete control over all operations . . . electrical controls spot troubles immediately, save lost production time . . . prevent equipment damage . . . instruments control and record every phase of the operation for present and future process analysis.

If you are considering a new plant . . . or expanding present facilities . . . it will pay you to check all the factors that make a Dorr-designed installation a modern and efficient chemical plant. Bulletin #8000 which gives the complete story is available on request. Better still, why not talk to a Dorr engineer? There is no obligation of course.

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N. J. Agronomists Meet

The Northeast Branch, American Society of Agronomy, will meet July 12-14 at the New Jersey Agricultural Experiment Station, New Brunswick, N. J., for discussions of pest control, soil and crop problems, and weed control in forage and small grains. Dr. W. H. Martin, dean and director of the New Jersey Agricultural Experiment Station will welcome the regional members.

Included in the program is a report on irrigation and soil management research, to be presented by Dr. G. R. Blake; Dr. S. J. Toth will direct an inspection of the soils laboratories, greenhouses, and small plot studies; and Dr. R. E. Engel will direct a discussion of species and management studies of turf grasses.

Tours in the course of the 3-day meeting will included visits to the Dairy Research Farm, Beemerville; Soil Testing Laboratory, Glassboro; Seabrook Farms, Bridgeton, and Walker-Gordon Farms, Plainsboro. The American Plant Food Council will sponsor a complimentary smorgasbord.

•

Award to R. T. Cotton

Richard T. Cotton, technical advisor in the Stored Products Insects Section of the Marketing Research Division, U.S.D.A., Washington, D. C., recently was awarded a distinguished service award by Secretary of Agriculture, Ezra T. Benson, in recognition of his work on insect pests of stored grain products.

•

New Miss. NH_3 Plant

Construction will begin immediately on the Mississippi River Fuel Corp.'s new $15,000,000 ammonia plant to be erected on a 4700-acre site near Crystal City, Missouri, 35 miles south of St. Louis. Mr. William G. Marbury, president of the firm announced that the prime contract has been awarded to The Fluor Corp., Ltd., Los Angeles. Marbury said his company expects to be supplying anhydrous ammonia, ammonium nitrate and ammonium solutions to the fertilizer industry and certain industrial accounts by early 1956. Initial capacity of the plant will be approximately 140,000 tons per year of the three basic nitrogen products.

•

Cominco Plans Fertilizer Plant

Consolidated Mining & Smelting Co., Canada, is planning a new fertilizer plant at Calgary, Canada. The company will probably produce urea by a high pressure treatment of ammonia gas, to yield a product of 45% available nitrogen.

Plant Food Buys Pomona

Plant Food Corp., Los Angeles, announced last month the purchase of the facilities of the Pomona Fertilizer Co., Pomona, Calif. Operations at the new branch will be under the management of Keith Annis, who has been associated with Plant Food Corp. for several years. Edward Struve, formerly manager of Pomona Fertilizer Co., will continue to act in an advisory capacity.

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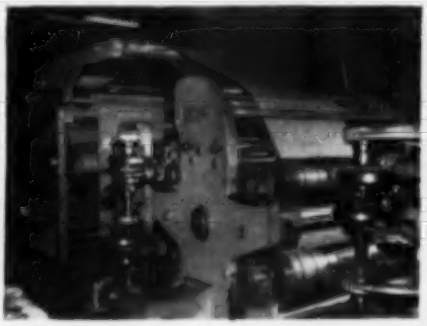

Photo at right shows V-C engravers making printing plates. Well-designed, expertly printed bags have real sales appeal—put your product out front. Photo above shows one of V-C's multi-color printing presses.

A battery of sewing machines staffed by highly-trained operators and inspectors. Modern machinery, skilled operators, and diligent inspectors, mean better-built, longer-lasting V-C Bags for your product.

THE BAG you use to package your product is only one of many items essential to your business success. But to the V-C Bag Division, the manufacture of better bags is a full-time job. That's why it will pay you to discuss your bag problems with a V-C representative. Possibly he can make suggestions that will improve or lower the cost of your packaging. Let him tell you about V-C's expert designing, printing, construction, and speedy service and delivery of V-C Multiwall Bags.

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THE following resolution was adopted by the Pacific Branch, Entomological Society of America, at their recent meeting in Bend, Ore., June 24th. The secretary of the branch was instructed to forward a copy of the resolution to Senator H. Alexander, chairman of the Labor and Public Welfare Committee, Senate Office Bldg., Washington, D. C.

Whereas, for many years farmers, chemical manufacturers and professional research entomologists have sought aid by federal legislation for authority to proceed in a safe and scientific fashion to protect growing food crops from insect and disease depredations, and yet be safe for human consumption and,

Whereas, the Miller-Aiken Bill is the result of long, intensive study and deliberation by some of our foremost authorities and represents the most constructive approach to the problem of producing insect- and disease-free agricultural products by a well-advised body of growers, and with no danger to the consuming public.

Therefore, be it resolved, that the Pacific Branch of the Entomological Society of America, assembled in annual meeting, June 24, 1954, urge the early consideration and passage of the Miller-Aiken Bill.

Hockley, Geiger Elected

Chester F. Hockley and Marlin G. Geiger were elected last month to the board of directors of W. R. Grace & Co. The election followed the recent merger of Davison Chemical Corp. into Grace. Davison became the Davison Division of W. R. Grace & Co.

Mr. Hockley is chairman of the advisory board and president of the Davison division. He had been president of Davison Chemical Corp. from 1936 to 1952. Mr. Geiger joined Davison in 1947 as a director and executive vice president and was elected president last year.

•

New Soil Testing Lab

Funds provided by a 25-cents-per-ton increase in the Arkansas fertilizer tax, under a law passed by the 1953 legislature, will provide free soil-testing service to Arkansas farmers in a new laboratory at the Cotton Branch Experiment Station of the University of Arkansas College of Agriculture near Marianna. Ceremonies dedicating the new laboratory, which will be used by staff members to conduct soil research in conjunction with the Experiment Station's activities, were held June 9 at an all-day farmers' meeting and open house. J. Earl Coke, assistant secretary of the U. S. Department of Agriculture, and Governor Francis Cherry of Arkansas were principal speakers.

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Safety Program Outlined

A three-year program for 1955-1958 of the Fertilizer Section, National Safety Council, was announced late last month, detailing plans, mode of action, and goals of the committee to reduce accidents and fires in the fertilizer industry. The plan includes the following methods:

Continuous improvement in general physical layouts of plants.
Encourage improvement of plant personnel.
Increased membership in the Fertilizer Section.
Increase interest in sectional safety contests.
More participation in state, city, and national meetings.
Increase visual aid implementation.
Encourage supplier organizations to call and help the small fertilizer plants.
Close co-operation with State Labor Departments where they can function to better safety and fire prevention.
We should aim at having a 10% reduction in frequency rates and 20% reduction in severity rates for the year 1955.
Improve information circulation system.
Promotion of field study if approved by the Greenbrier Executive Committee Meeting.
Take a look at insurance costs.
Establish a research committee to work on new problems.
Development of key personnel.

•

New Westvaco NH₃ Plant

Westvaco Chlor-Alkali Division, Food Machinery & Chemical Corp., New York has been authorized to build an anhydrous ammonia unit at its South Charleston, W. Va. plant. The new plant with a capacity of 60 tons per day will use by-product hydrogen from Westvaco's caustic soda operations. Completion is scheduled for late 1955.

•

Agronomists Meet at Rutgers

Several hundred agronomists from the area were scheduled to attend a meeting of the Northeast Branch, American Society of Agronomy, at New Brunswick, N. J., July 12-13. A complete program of talks, demonstrations and tours on crops, soils, irrigation and other subjects had been planned for the group.

Rutgers University and the New Jersey College for Women acted as hosts for the men and their wives who attended the sessions. One of the highlights of the meeting was a talk on weed control in forages, small grains, corn and potatoes, by Dr. R. J. Aldrich. The American Plant Food Council was host at two smorgasbords.

•

Ships First Sulfur

The Mexican Gulf Sulphur Co., reported early in June that it was making its first shipment of sulfur from its San Cristobal, Mexico plant, which has been under construction since 1952.

St. Regis Staff Appointments

St. Regis Paper Co., New York, announced last month the appointment of L. G. Hill and A. A. Roetzer as assistant general sales managers of the Multi-wall Packaging Division. Herman S. Rhodes was appointed engineering coordinator to provide liaison between the Providence machine shop, general sales and the managers of engineering in each of the respective districts, in attendance.

PESTMASTER* TECHNICAL GRADE DDT is preferred by manufacturers of quality insecticides because of properties that make it easy to work. The unusual hardness of Pestmaster* brand simplifies the grinding, and its uniform cleanliness contributes to ease of handling. Its quality is unexcelled.

MICHIGAN CHEMICAL TECHNICAL GRADE DDT is distributed in the United States and possessions by Wyandotte Chemicals Corporation, Wyandotte, Michigan, and may be ordered through them in any quantities, with the usual fast delivery enjoyed through Michigan Chemical Corporation.

PESTMASTER* 75% AND 50% DDT WETTABLE POWDER AND DUST CONCENTRATES. The wettable formulations have quick wetting properties, and are intimately and uniformly blended with the carrier. Their unusual quality is in their excellent suspension properties. They remain uniformly in suspension. The 75% Wettable powder is made to World Health Organization specifications, and *has been especially designed to withstand severe tropical conditions of use and storage.*

PESTMASTER* 25% DDT EMULSION. Here is a 25% emulsion with low phytotoxic qualities that reduces to a minimum the danger of burning foliage when used properly, and emulsifies in water of any degree of hardness. It emulsifies quickly and meets all quality standards.

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Research Bureau Disbands

The Coke Oven Ammonia Research Bureau discontinued operations

H. H. TUCKER

as of June 30th, according to H. H. Tucker, president, after 15 years of service to the industry. A gradual decrease in member participation in the Bureau was cited as one reason for the decision to disband. Members of the Bureau are in steel, coke and gas industries.

The Bureau was originally established in 1939, with Mr. Tucker at its head, to provide a central research service for the ammonia industry.

Mr. Tucker has not announced definite plans for the future, but indicated an interest in locating in the agricultural industry.

•

NFA Issues Survey Report

The National Fertilizer Association issued last month an 11-page report containing data obtained from State fertilizer and pesticide control officials, summarizing the latest information on the preparation of fertilizer-pesticide mixtures. The report lists the replies to 20 questions dealing with regulations, sale, bagging, analysis, tolerances, etc. of fertilizer-pesticide combinations.

•

Davison Names Exec. VP

William E. McGuirk, Jr., was appointed executive vice president of Davison Chemical Co., Division of W. R. Grace & Co., Baltimore. He became vice-president of W. R. Grace & Co., in January, 1954.

•

'53 Pesticide Prod. 15% Off

Production of all pesticides and other organic agricultural chemicals was 356,000,000 pounds, a decrease of 15 per cent from the previous year, according to recent estimates by the U. S. Tariff Commission.

The Commission report also gave statistics on production and sales of pesticides by principal uses: fumigants, fungicides and seed disinfectants, herbicides, soil conditioners, and plant hormones. Production of acyclic pesticides and agricultural chemicals amounted to $9,000,000 lbs. compared with 46,000,000 lbs. in 1952.

•

Calunite to Mfg. Fertilizer

Alunite, a mineral which lies mostly near the surface of the earth in southern Utah, may soon be turned into low-cost fertilizer by Calunite Corp., which has western headquarters in Altadena, Calif., and eastern headquarters in New York. The company has been doing developmental work on alunite for six years.

•

Ag Engineers in Minn.

Reports on new and better application equipment for the agricultural chemical industry highlighted the 47th annual meeting of the American Society of Agricultural Engineers, held June 23rd in Minneapolis.

*Insects have no future with MALATHION SPRAYS**

emulsified with EMCOLS H-140 and H-141

Crop or Fly Sprays in hard or soft water have the requisite spontaneity and emulsion stability when EMCOLS H-140 and H-141 are used—and you reduce your formulating costs with these stable, fluid emulsifiers.

***Recommended:**
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Monsanto Ups Symes

William F. Symes has been elevated to the post of group leader of Monsanto Chemical Co.'s nitrogen group, E. G. Somogyi, Inorganic Chemicals Division research director reported late last month.

Mr. Symes, a native of Tennessee, joined Monsanto in 1951 at the research facilities of the former Merrimac division at Everett, Mo.

•

Fertilizer Safety Planned

A "Three Year Plan" for fertilizer safety, first of its kind in the National Safety Council, was approved at the executive committee meeting of the NSC Fertilizer Section June 13 in the Greenbrier Hotel, White Sulphur Springs, W. Va.

Vernon S. Gornto, general chairman of the section, reports that "no other section of the Council ever before has charted its course on paper for a full three year period in every detail". The three year plan was presented by John E. Smith and adopted unanimously by the 20 executive committee members attending the meeting, which was held in between the American Plant food Council and National Fertilizer Association annual meetings.

The committee also approved a plan to conduct an employee motivation field survey, also an innovation for NSC sections. In other action, the committee chose Memphis, Tenn. for its December executive meeting to be held Dec. 7.

A series of talks, displays and question-and-answer programs was approved for the fertilizer section meeting to be held Oct. 18 and 19 in connection with the NSC meeting. The program will be held in the La Salle Hotel, Chicago.

Talks tentatively scheduled for the section meeting include the following: "The Fertilizer Worker in a Small Plant Can be Reached with a Safety Program", Dr. Charles W. Nelson, Industrial Relations Center, University of Chicago; "A Small Plant Safety Program That Will Work", W. C. Creel, Dept of Labor, North Carolina; "Visual Aids That Can Be Used by the Small Plant Superviser", R. Murray, safety director, Swift & Co.; and "The Job Ahead," R. J. Rhinehart, division superintendent, Arkansas Power and Light Co.

•

Bemis K-C Mgr. Retires

Howard L. Bayne has announced his forthcoming retirement as manager of the Kansas City plant and sales division of Bemis Bro. Bag Company, effective August 31. He will be succeeded as manager by L. E. Cox, now assistant manager.

Joins Stauffer Sales Staff

Alfred N. Wohlend has joined the technical sales staff of Stauffer Chemical Company, New York, it has just been announced by T. A. Haschke, director of sales, Industrial Chemicals Division. Mr. Wohlend, a chemical engineering graduate of the University of Michigan, is a specialist in the marketing of organic chemicals. He was formerly president of Gator Chemicals, Inc., St. Petersburg, Fla. Mr. Wohlend will headquarter in New York.

Del-Mar-Va Meets in Md.

Nearly 100 members of the Del-Mar-Va Peninsula Fertilizer Association heard reports on the value of fertilizer in increasing crop yields at the annual meeting of the group in the Hotel George Washington, Ocean City, Md.

Meeting June 25 and 26, the fertilizer group heard an address by Claude E. Philip, University of Delaware, on the university's program for increasing farm profits. He presented statistics to show that for every dollar spent on fertilization of corn, $3.94 is returned.

Louis Wilson, director of information, American Plant Food Council, and W. R. Allstetter, vice president of the National Fertilizer Association, were welcomed to the meeting and gave brief talks.

President E. H. McGrath, of Farmers & Planters Fertilizer Co., Salisbury, Md., gave the opening welcome as president of the organization, and introduced fertilizer control officials from the three states.

Former Governor Elbert N. Carvel, of Delaware, also greeted the group and introduced Mr. Philip.

Other officers of the association, elected last December, include J. O. McAllister, Dorchester Fertilizer, Cambridge, Md., vice president; Robert A. Fischer, Milford Fertilizer Co., Milford, Del., secretary; and John Ford, Warner W. Price Co., Smyrna, Del., treasurer.

•

Conn. Field Day Plans

Plant diseases and what agricultural research is doing about their control will be the central theme of the Connecticut Agricultural Experiment Station's annual field day, which is scheduled for August 18. The field day will be held at the station's experimental farm at Mt. Carmel, Conn.

To carry out the main theme, each station department will display phases of its work, which relate to disease control. The soils department, for example, will show how deficiencies or excesses of various elements in the soil can cause plants to show di-

ease symptoms. The genetics department will demonstrate with some of its new mosaic resistant tobacco strains how disease can sometimes be overcome by plant breeding. The entomology department will show how some diseases can be controlled, and the plant pathology department will show some of the new materials and methods used in combating plant diseases. Station director, James G. Horsfall, will be the chief speaker at the field day.

•

Pest Control Book Issued

A most welcome second edition of the well-known "Handbook of Pest Control," by Arnold Mallis, has been published by MacNair-Dorland Co., New York. This mammoth volume of 1046 pages plus indexes, contains exhaustive information on pests of all sorts, their habits and the best means of eliminating them.

A key to the urbane way in which Mr. Mallis approaches his subject may be found in the preface, where he advises "This handbook concerns itself with household pests other than man, classical examples of which are the cockroach and the bedbug. In numerous instances the author wanders from the immediate vicinity of the threshhold to pay his respects to an ant, sowbug, or similar pest whose permanent abode is other than the home of his unhappy host."

The book is far from a handbook, in the physical sense. It measures six by nine inches and has a hard cloth binding. Included in the contents are chapters on rats and mice, roaches, termites, ants, mites, flies, mosquitoes, ticks and many other pests.

Since 1945, when the first edition was published, pesticides have undergone many changes. The second edition is designed to widen the original coverage of the subject, and to bring the volume up to date, with references to the latest insecticidal materials. Price of the handlbook is $9.25 in the United States, $9.75 for foreign. Copies available through *Agricultural Chemicals*.

8th Annual Cotton Mechanization Conference July 28-30

BETTER ways to grow cotton will be discussed from all angles at the 8th annual Beltwide Cotton Mechanization Conference to be held in the Marion Hotel, Little Rock, Ark., July 28-30. The conference is sponsored by the National Cotton Council in cooperation with the University of Arkansas, Cotton Belt land grant colleges, Farm Equipment Institute, USDA and other groups.

Land preparation, fertilization, weed, disease and pest control, and mechanization all are on the agenda. A panel in the opening session will be concerned with latest chemicals and techniques in weed control, including pre-emergence materials.

R. Flake Shaw, president of the North Carolina Farm Bureau Federation, will preside over the initial session July 28.

Thursday's sessions will be held in the Joe T. Robinson Memorial Auditorium. A tour of the farming area around Little Rock is scheduled Friday morning and a field demonstration, highlighting pre-harvesting cotton production practices, will be held at the Harold A. Young farm in the afternoon.

The program is as follows: Wednesday afternoon — Address of welcome by John T. Caldwell, president, University of Arkansas; "A New Era in Mechanization Progress," Harold A. Young, chairman of the board of directors, National Cotton Council

"A Profile of an Efficient Cotton Belt Agriculture," O. V. Wells,

(*Turn to Page* 112)

NEWS Brevities

THOMAS P. TURCHAN was named manager of manufacturing for American Cyanamid's Agricultural chemicals division last month. He was formerly plant manager of North American Cyanamid Limited's Niagara Falls plant, and has served with Cyanamid since 1952.

•

G. RUSSELL DORMAN, administrative assistant at California Spray-Chemical Corp., Richmond, Cal., died suddenly May 7. He had served with Calspray since 1932, when he joined the company as a technical research adviser in Vincennes, Ind. He was moved up to eastern district manager in 1944 and was transferred in 1953 to the home office of the company in Richmond.

•

GENERAL MANAGER of the new nitrogen fertilizer plant at Lawrence, Kan., is R. R. Zurbuchen, former director of manufacturing for Consumers Co-Operative Association of Kansas City. Mr. Zurbuchen will have his office at the $16 million plant which is scheduled to start production this month.

•

THE HAMILTON, ONT., city council is studying the Bay pollution problem with an eye toward producing organic fertilizer from sewage sludge.

•

A PRICE INCREASE of 15 cents per cwt. on all grades of caustic soda has been announced by Diamond Alkali Co., Cleveland, O., effective July 1.

•

DONALD B. BENEDICT has been appointed works manager of Carbide and Carbon Chemicals Co., a division of Union Carbide and Carbon Corp. He joined the company in 1933.

•

R. W. LAHEY JR., has been appointed sales manager of Bemis Bro. Bag Co.'s Norfolk plant and sales division. He has been with Bemis since 1946.

•

PACIFIC GUANO CO. has named Dr. R. B. Bahme manager of agriculture chemicals department of the company. Dr. Bahme formerly was with the Grasselli Chemicals Department of DuPont.

•

ROY S. ERICKSON last month was named assistant manager of the technical service department in the Michigan Alkali division of Wyandotte Chemicals Corp., Wyandotte, Mich.

•

KARR & CO., Columbus, O., announce that they are manufacturing special processed feather meal with 15 to 18 units of ammonia.

•

AN ANHYDROUS AMMONIA plant built by Sherritt Gordon Mines Ltd., of Toronto, is operating in excess of rated capacity, it was announced last month. Eldon L. Brown, president of the company, made the announcement at a stockholders meeting.

•

KEITH O. CARTER of Stillwater, Okla., has joined the chemical sales staff of Colorado Fuel & Iron Corp. He will sell nitrogen materials to fertilizer mixers in Oklahoma, Arkansas and Eastern Texas. He was formerly with Armour Fertilizer Works.

A NAME CHANGE, to Ohio Lime Co., has been made by the former Ohio Hydrate & Supply Co. Company location is Woodville, O.

•

JAMES A. MUNDIE has been named sales superviser of Fulton Bag & Cotton Mills at its New Orleans plant. Mr. Mundie will assist Louis J. Even.

•

NEW SALES ENGINEER for Baughman Manufacturing Co., Jerseyville, Ill. is Hugh O. Geeslin Jr., of Birmingham, Ala. The company manufactures a complete line of conveying equipment, and bulk transport machines.

•

FRANK L. BERRY is a new representative in the Philadelphia territory for Arkell and Smiths paper bag company.

•

CARL F. PRUTTON, vice president and technical director, chemical divisions of Food Machinery & Chemical Corp., New York, recently received the honorary degree of Doctor of Engineering from the Case Institute of Technology.

•

BERSWORTH CHEMICAL CO., Framingham, Mass., announced late in June that the name of the company has been changed to "Versenes Inc." No other change in structure or personnel of the concern is contemplated.

•

T. P. TURCHAN, Niagara plant manager of North American Cyanamid Ltd., since 1952, has been appointed manager of manufacturing for the Agricultural Chemicals Division of American Cyanamid Co.

•

G. A. WHEATLEY, scientific officer at the agricultural research station in Warwickshire, England, will spend the next four months at the Connecticut Agricultural Experiment Station as a visiting scientist. His special interest is insecticidal dusts.

•

THE AMERICAN PETROLEUM INSTITUTE, New York, announced recently the inauguration of a new research project to develop as much information as possible on types, identities and amounts of nitrogen compounds in crude oil.

•

JOSEPH MCKENNA left the United States recently for Costa Rica where he is reported to be engaged in installing an insecticide plant for principals in that country. He may be contacted care of the Gran Hotel, San Jose, Costa Rica.

•

PLANT FOOD CORP., Los Angeles, has appointed J. J. Bingham manager of its northern division, with headquarters at Bakersfield, Calif.

•

AMERICAN CYANAMID CO., New York, announced late last month the appointment of Gailon C. Ford ce as assistant director of purchases.

•

JAMES A. FARLEY has been named field sales manager of the industrial chemicals sales department of Commercial Solvents Corp., New York. He was formerly district manager of the Boston office.

PACIFIC ESA

(*From Page 69*)

four covers, but now they are down to one or two a year. Eight years after DDT at 25 pounds technical per acre was applied, 44% was left. This orchard experience points up the possible accumulation of soil residues from foliar applications of insecticides.

The length of residual effect in the soil is dependent on material, rates, method of application and formulation used, Morrison stated. He discussed the work in Oregon on small plots with the use of a rotary tiller. Shallow mixing gave effective pest control for two to three weeks; deeper mixing gave control for a longer period. Excessive mixing, however, tended to bring much of the material up to the soil surface.

Work in progress at the Citrus Experiment Station, Riverside, was outlined by M. H. Frost of that station. Their work includes aldrin, dieldrin, chlordane, heptachlor, endrin, lindane and toxaphene. These materials were disced down to a six inch depth. Chemical analyses have been completed for the first year of the project. As a result of these analyses, soil insecticides are broken down into (1) quite persistent — DDT, Dieldrin, (2) medium in persistence —Toxaphene, Chlordane, (3) rapid release—Aldrin, Lindane, Heptachlor.

"Factors causing decline of insecticide materials in soil can be soil organisms as well as other factors such as the chemical nature of the soil, amount of organic matter—which contributes to sorption, soil particle size, temperature, drainage, water table, etc," Mr. Morrison said. He also cited attempts to correct soil contamination in the east with activated carbon on BHC residues. He offered the suggestion of summer fallowing coupled with intensive cultivation. In answer to the question of specificity of insecticides, Morrison cited the case of DDT, which does an excellent job of control on one wireworm (*Limonius* sp), but does not affect another wire worm closely related to it. Materials as heptachlor, aldrin and dieldrin appear to be multi-purpose in activity.

Granular Insecticides

GRANULAR insecticides were discussed by C. E. Miller, Colloidal Products, San Francisco. He mentioned they were designed principally for use in fertilizer mixes, but are also effective when flown on pasture areas. The Canadians have applied large quantities to snow covers for later control of mosquitoes.

Most of the present granules are not too uniform in size, but users say they are working. Emulsive agents are used in some formulations. Two types of carriers are used mainly. These are Fullers' earth and Bentonite. Where the concentration of toxicant is 5%, Fullers' earth should be used. Bentonite granules break down rather rapidly in the soil. The screen size most universally used is a 30/60.

One problem aside from that of

(*Turn to Page 106*)

INDUSTRY *Patents*

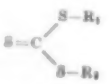
The information below is furnished by patent law offices of

LANCASTER, ALLWINE & ROMMEL

402 Bowen Building
Washington 5, D. C.

The data listed below is only a brief review of recently issued pertinent patents obtained by various U. S. Patent office registered attorneys for manufacturers and/or inventors. Complete copies may be obtained direct from Lancaster, Allwine & Rommell by sending 50c for each copy desired. $1.00 for Canada. They will be pleased to give you free preliminary patent advice.

2,676,129. ALIPHATIC TRITHIOCARBONATE NEMATOCIDES. Patent issued April 20, 1954, to Joseph T. Bashour, New York, N. Y., assignor to Stauffer Chemical Company, a corporation of Delaware. A nematocidal composition including an inert adjuvant as a carrier for the nematocide and containing as an essential active ingredient a compound having the formula:

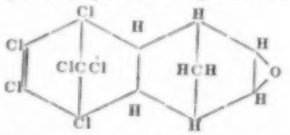


wherein R_1 and R_2 are the same alkyl radicals having from one to three carbon atoms.

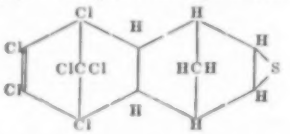
2,676,130. INSECTICIDAL 1,2,5,6-TETRAHYDRO-2,5 - METHANO - 2,3,4,5,7,7 - HEXACHLOROBENZYL ALLYL SULFIDE. Patent issued April 20, 1954, to Alexander Winterstein, Chicago, Ill., assignor to Arvey Corporation, a corporation of Illinois. As a new composition of matter 1,2,5,6-tetrahydro-2,5 - methano -2,3,4,5,7,7-hexachlorobenzyl allyl sulfide.

The method for controlling *Aphis gossypii* infestations which comprises applying to said insect and its habitats 1,2,5,6-tetrahydro-2,5 -methano -2,3,4,5,7,7- hexachlorobenzyl allyl sulfide.

2,676,131. HALOGENATED HETEROCYCLIC INSECT TOXICANTS. Patent issued April 20, 1954, to Samuel Barney Soloway, Denver, Colo., assignor, by mesne assignments, to Shell Development Company, Emeryville, Cal., a corporation of Delaware. A compound of the group consisting of (1) the compound having the formula:



and a melting point when pure of about 176°-177° C., said compound being the epoxide of the Diels-Alder adduct obtained by heating hexachlorocy-clopentadiene and bicyclo -(2,2,1) -2,5-heptadiene, and (2) the compound having the formula:

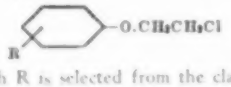


and a melting point of about 199°-202° C., said compound being the episulfide of the Diels-Alder adduct obtained by heating hexachlorocyclopentadiene and bicyclo-(2, 2,1) -2,5-heptadiene.

An insecticidal composition of matter comprising a compound of claim 1 disseminated in an insecticidal adjuvant as a carrier therefor.

2,676,879. METHOD OF DESTROYING UNDESIRABLE PLANTS. Patent issued April 27, 1954, to Arthur H. Schlesinger, Dayton, Ohio, assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware. The method of destroying undesirable plants which comprises applying to said plant a toxic quantity of a herbicidal composition comprising a ketone selected from the class consisting of *a*-naphthyl alkyl ketones and *b*-naphthyl alkyl ketones in which the alkyl radical has from 1 to 4 carbon atoms.

2,676,880. HERBICIDAL COMPOSITIONS. Patent issued April 27, 1954, to Arthur H. Schlesinger, Dayton, Ohio, assignor to Monsanto Chemical Company, St. Louis, Mo., a corporation of Delaware. The method of destroying undesired plants which comprises applying to said plants a toxic quantity of a herbicidal composition containing, as the essential active ingredient, a *b*-chloroethyl ether having the formula:



in which R is selected from the class consisting of hydrogen, chlorine, and the methyl and ethyl radicals.

Suppliers' BULLETINS

Betner "Duo-Tite" Bags

Shellmar-Betner flexible packaging division of Continental Can Co. New York offers the "Duo-Tite" bag

that features a sift-proof top and bottom closure. The Duo-Tite bag is used in packaging insecticides, rodenticides, fertilizers and other chemicals, in quantities of from one to twenty pounds. It is made up of a natural or supercalendared bleached kraft outer shell and a liner of kraft or pouch stock that can be laminated with various materials for extra protection.

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New Shell Booklet

The Shell Chemical Corp., New York, has issued a new booklet on the uses of aldrin in control of grasshoppers. The 8-page leaflet reviews time and dosages of application, types of sprays, dusts and baits.

•

New "Payloader" Model

The Frank G. Hough Co. Milwaukee has announced another addition to its line of "PAYLOADER" tractor-shovels with the model HRC, a 4-wheel-drive unit with bucket capacity of one cubic yard struck-load and 1 1/3 cubic yard payload (heaped). The new model is available with either gas or diesel engine and is equipped with power-steering for ease of operation and maneuverability. Another feature, is a heavy-duty, full-reversing transmission which provides four speed ranges in either direction.

•

New Hypro Leaflet

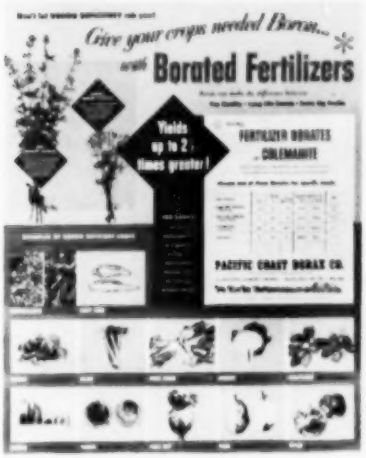
Publication of an illustrated catalog sheet describing the Hypro G3800 gasoline engine powered pump was announced last month by Hypro Engineering, Inc., manufacturers of roller and rubber impeller pumps in Minneapolis, Minn.

The two-color piece is designed for use both as a catalog sheet and an envelope stuffer for easy mailing. Uses for homes, farms, resorts, boats and building trades are listed, along with product specifications.

•

KBH Corp., Clarksdale, Miss., offer a new KBH coulter and press wheel assembly for use with the row crop ammonia applicator to adapt it to broadcast work. The attachments are designed especially for ammonia application to pastures and small grains, and can be used for row crop application as well.

Pacific Borax Poster



Pacific Coast Borax Co., Los Angeles, are distributing a 17 x 22 inch four-color educational poster, illustrating 12 boron-deficient crops. The 3 x 2½ inch illustrations of each malformed plant show diseased symptoms of crimson clover, sweet corn, tobacco, celery, swiss chard, cabbage, cauliflower, turnips, carrots, table beets, pears, and apples. Application rates of borated fertilizers recommended to prevent boron deficiency are given.

•

Butler Offers New Tanks

Butler Manufacturing Co., Kansas City, Missouri, has added to its tank line with tanks for the storage of low pressure and non-pressure bulk liquid nitrogen solutions. Bolted aluminum bulk storage tanks with a capacity of from 12,000 to 23,000 gallons are available for bulk storage plants. Butler also is introducing welded tanks for the storage of low pressure nitrogen solutions.

•

Mud Hog Crusher

Fertilizer manufacturers who must crush materials in their manufacturing process may be interested in a new booklet issued by Jeffrey

HOME-GARDEN SALES

In St. Louis, and other parts of the country, fuel oil dealers are putting idle delivery trucks to work, by selling on a contract basis a lawn and shrub fertilizer service, using such products as Monsanto's "Folium", water soluble fertilizer.

Manufacturing Co., of Columbus, O. The publication describes the Jeffrey Mud Hog Crushers, which, the company states, are specially designed for crushing all types of wet sticky materials.

A traveling breaker plate prevents plugging, Jeffrey claims, and is adjustable for a wide range of product size. Complete specifications for the crushers are given in the 12-page booklet.

PACIFIC ESA

(*From Page* 103)

formulation is registration and "dual inventory" in the case of fertilizer mixers who may have a blend of insecticide-fertilizer of one formula and the same fertilizer formula without the insecticide. At present, granules are a special-purpose tool, to be used in situations where economy is not as important as safety of personnel or crop, or insecticide placement.

Many of the phenomena associated with the decline in toxicity and incompatibility of granules are not well understood. At times, breakdown of the chemical can be quite rapid. Some authorities claim there is surface activity on the granule, and a neutral surface is needed so the effect of the chemical is not lost.

Organoleptic tests at the Food Technology Department, Oregon State College, were discussed by Mrs. Lois Sather. Use of BHC in 1947 triggered flavor studies on potatoes, and these have now been extended to include all insecticides used in the soil. Their methods include use of two panel groups, with statistical evaluation of the results. An attempt is made to get flavor checks early in the experimental soil treatments, so that a well-rounded program can be followed in harvesting the crop, processing it and storing it. Before testing, samples are prepared in their kitchen and known conditions prevail from the time the crop is harvested until it is sampled by the panel. Their results to date indicate one material, lindane, as a "bad actor". This was at the three pound level on certain root crops.

Difference in maturity date of corn was noted when treated with certain soil materials. This ranged from one to two days between the treated corn and the check. Moisture level was 82 on check and 85 to 87 on treated plots.

Insecticide treated products in some cases have been preferred consistently over the check. No differen in flavor of strawberries was found with aldrin at 3.5, and 7 pounds technical; dieldrin 3.5 and 7 pounds; and chlordane at 10 pounds technical per acre. Canned strawberries with aldrin, dieldrin, heptachlor, isodrin and chlordane will be tested this season.★★

EDITORIAL

(*From Page 27*)

the former pattern. The farmer has been sold the idea that use of fertilizer pays whether crop prices are high or low,—that fertilizer can be used to boost output when prices are high,—and to lower unit costs of the food crop he produces when prices are falling, thus preserving a bigger share of his normal profit margin. This is the theme on which the industry should continue to hammer away. In this direction lies added stability and prosperity for the farmer,—and for fertilizer manufacturers as well.

APFC CONVENTION

(*From Page 36*)

as they did. . . . I believe more work emphasizing the economics of fertilizer use would benefit the fertilizer industry as well as farmers and the general public."

Paul D. Sanders, editor of *The Southern Planter*, was the speaker at the banquet the evening of the 12th, which concluded the convention. He termed as "one of the modern miracles of American industry" the ability of the fertilizer industry "to supply farmers with ever-increasing quantities of plant food year in and year out, in war and in peace, at prices all could afford to pay." He added that the Council's ". . . enthusiastic support of agricultural research . . . crusade for good land management . . . and vigorous efforts to engender in the minds of farm youth the philosophy that 'a rich soil builds a rich civilization' have won for this great trade association the admiration and affection of farm leadership throughout America."

Awards were presented at the convention by Louis Wilson, secretary and director of information of the APFC, to two journalists in the second annual Soil Builders Award for Editors, for "superior journalistic contributions toward the building of the soils of our nation". Those honored were Robert P. Crossley, editorial director of *Capper's Farmer*, Topeka, Kans., and Earl W. McMunn, editor, *The Ohio Farmer*.★★

INSECT OUTLOOK

(*From Page 57*)

Gypsy Moth In Michigan

The Gypsy moth, which for many years has been rather successfully contained in the northeastern

section of the United States was discovered May 20, 1954, in Lansing, Michigan. The known infested area is in the southern edge of Lansing and consists of approximately 10,000 acres. Immediately upon discovering the infestation, action was taken by the Michigan State Department of Agriculture and the U. S. Department of Agriculture to eradicate the infestation. Application of DDT by mist blower in the known infested area has been made as well as extensive air applications in the immediate and surrounding areas. The Michigan legislature has appropriated funds for control and extensive survey.

Khapra Beetle in New Mexico

The khapra beetle (*Trogoderma granarium*), a serious pest of certain stored products, particularly grains, was first discovered on the North American continent in Tulare County, California, in November, 1953 (*Agricultural Chemicals*, December 1953). Subsequent surveys by the California State Department of Agriculture indicated that a heavy infestation of this insect occurred in Fresno as early as 1946 and that it was an established storage pest at the time of discovery. In early February, 1954, an infestation was reported from Phoenix, Arizona.

Following these developments, the Standard Quarantine Committee of the Western Plant Board petitioned the United States Department of Agriculture for assistance in conducting a survey to determine the general distribution of *T. granarium* in the Western States. A survey was undertaken in early April with the Economic Insect Survey Section, Plant Pest Control Branch, The Agricultural Marketing Service and certain western States cooperating.

The number of inspections of grain warehouses and mills was as follows: Colorado 67, Utah 77, Idaho 29, New Mexico 21, Texas 6, Nevada 19, and Oregon 36. Limited inspections were made also in the State of Washington. Inspections in Arizona and California were limited since the pest had already been found in those States and considerable work had been conducted by State personnel. For the purpose of this detection survey, inspections in Wyoming and Montana were not believed necessary. According to records of the States involved and results of this survey, infestations of *T. granarium* in the United States are known to be in the following counties: ARIZONA-Maricopa, Pinal, Pima, Yuma and Mohave; CALIFORNIA — Imperial, Kern, Riverside, Tulare and Fresno; NEW MEXICO — Roosevelt and Curry.

In addition to being a serious pest of stored products, this dermestid is of concern to the brewing industry since, in England, it is known to infest malt houses. Dry storage conditions are not a hindrance to the activities of the pest, since it can complete its life cycle in grain with moisture content as low as two percent. Control is difficult and fumigation recommendations are double the dosage ordinarily used.★★

NFA REPORT

(*From Page 43*)

said this may occur either in the solid or liquid phase of the mixture. Mr. Coffin indicated that ammoniation in the continuous granulation process took place while the mixture is in the slurry form.

Granulation of High Analysis Fertilizers

L. D. Yates, Tennessee Valley Authority, Wilson Dam, Ala., outlined the pilot-plant operations of the TVA in the granulation of high analysis fertilizers. The TVA process consists of a rotating continuous ammoniator, granulator, rotary drier, and screens to sort-out fines and oversize, which are recycled to the ammoniator.

Mr. Yates indicated that a current line of investigation is to find means of granulating the high analysis mixtures under conditions that yield products of low-moisture content, which may not require drying. Two methods toward this objective are: (1) the introduction of steam under the bed in the ammoniator and (2) the direct use of sulfuric acid in the ammoniator. Good granulation of 6-12-12 was obtained using 80 pounds of steam per ton of product, which contained 4.8 per cent moisture. Other tests required as much as 150 pounds of steam per ton of product. Temperature of steam or water affects the total amount of water required for granulation and affects also the temperature and moisture content of the ammoniator product. Bag-storage tests indicated that granular 6-12-12 with as much as 5 per cent moisture did not cake in nine months' storage; whereas non-granular material of the same moisture content caked very firmly in that same period.

Mr. Yates pointed out that there is a tendency for potash content to increase somewhat as particle size decreases; and that blending of fines in the cooler with those from crushing the oversize before being recyled yields a final product which contains plant foods in the proportions added originally.

L. to R. W. J. Murphy, American Potash Co., New York; J. C. Totman, Summers Fertilizer Co., Baltimore; W. Mortimer, Nitrogen Div., Allied Chemical & Dye Corp., New York; Mr. and Mrs. Bradley, Union Bag & Paper Corp., New York; and Mr. and Mrs. F. B. Porter, Atlanta, Ga.

Research on Granulation

A REVIEW of the historical development of USDA participation in the granulation of fertilizers was outlined by John O. Hardesty, USDA, Beltsville, Md., who traced the studies from 1922, through the adaptation of rotary agglomeration in 1930, to the current studies of high-nitrogen mixtures. Mr. Hardesty indicated that special emphasis is being placed on mixtures having 1:1:1 nutrient ratios in grades as high as 15-15-15, in which the nitrogen is supplied mostly or entirely in the form of free ammonia and ammonium nitrate or urea. The initial results of this work, which is being done in cooperation with the Tennessee Valley Authority, indicate that with close control of the temperature-moisture relationships, especially in the agglomeration stage, high yields of product in the particle-size range of 6 to 20 mesh are possible. Because of the high solubilities of ammonium nitrate and urea and, consequently, the pronounced effect of these salts on the volume of the liquid phase, the moisture required for efficient agglomeration at a specified temperature is markedly influenced by the proportion of am-

monium nitrate or urea included in the mixture.

Commercial Application

THE commercial considerations of various methods of granulation were considered by Robert J. Engelhardt, John J. Harte Co., in his discussion during the symposium. He reminded his listeners that since the end of World War II the demand for granulated fertilizers has increased to such an extent that there are practically no fertilizer manufacturers who are not giving some serious thought to this form of product.

Mr. Engelhardt pointed out that granulation systems fall into three general classifications: (1) the wet-dry system, in which water is added to promote agglomeration of the powdered materials, and then drying; (2) systems in which moisture which has been added to promote agglomeration is driven off by means of heat supplied by some chemical reaction that is taking place in the mixer; (3) systems in which ammoniation and often acidulation of rock take place in a slurry state. After reviewing each system and comparing certain characteristics of the three classes, Mr. Engelhardt summarized his remarks in pointing out that the second method, which is the Davison granulation process, requires the least amount of capital expenditure for conversion of existing facilities, and shows the lowest operating cost figures; the wet-dry system offers the greatest flexibility; and the slurry system produces the lowest cost product, but usually shows the highest operating costs and also requires the largest amount of capital expenditure for conversion of existing facilities.

The selection of the granulation system, Mr. Engelhardt emphasized, depends on careful evaluation of all the economic factors involved, consumer demands, etc. He said that it was unlikely that any one method would be best for all of the possible combinations of conditions that can exist.

Banker-Farmer Education

SALES aids, agricultural financing, farmer education of crop needs, etc., were stressed in the panel, "What Makes Fertilizer Move," at which H. H. Tucker, Coke Oven Ammonia Research Bureau, Columbus, O., was moderator. The background of application of required nutrients, soil fertility and irrigation, residual effects of fertilizers, etc., was presented by George Smith, University of Missouri. Dr. Smith presented data illustrating yield vs. cost figures of current production and possible production, using different amounts of fertilizer. Dr. Smith observed that "Fertilizer manufacture and sales should be designed to give the farmer what he needs . . . not what the manufacturer may want to sell."

O. E. Anderson, Ohio Bankers Association, pointed to a program of encouraging dealers to consistently contact their local banker well in advance of each sales season, and give the banker a detailed picture of the prospective movement of fertilizer in that community, the names of farmers who are likely to need assistance through direct bank loans, plus a general analysis of any trouble spots that might possibly develop.

Another education program was suggested by Harold R. Dinges, Spencer Chemical Co., who stressed the tremendous need for a large-scale agricultural promotion plan throughout the country, to develop new and existing markets. He pointed particularly to the question of fall application of fertilizers, and suggested a rough outline for advancing such a plan throughout the areas where fall application could be considered remotely feasible. Mr. Dinges emphasized that "what will make fertilizer move in the future will be the kind of sales development job we, as the fertilizer industry, begin to do right now."

Weller Noble, retired president of Pacific Guano Co., was elected to honorary life membership in the NFA during the annual convention.

He served on the NFA Board of Directors continuously since 1923, and was Board Chairman in 1946 and 1947. Mr. Noble retired as president of Pacific Guano Co. in 1953 after 45 years with company.

COTTON CONFERENCE

(*From Page 99*)

Washington, administrator, Agricultural Marketing Service, United States Department of Agriculture.

Panel discussion, "Beltwide Progress, Needs and Problems in Pre-Harvest Mechanization of Cotton," Dr. E. G. McKibben, Beltsville, Md., chief, agricultural engineering research branch, Agricultural Research Service, USDA, leader.

"Land Preparation, Planting, and Fertilization," Rex F. Colwick, State College, Miss., correlator, Regional Cotton Mechanization Project; "Chemical Weed Control," Harold T. Barr, Baton Rouge, head, agricultural engineering research, Louisiana State University.

"Mechanical Weed Control," Fred C. Elliott, College Station, cotton work specialist, Texas Agricultural Extension Service; "Insect and Disease Control," Dr. H. G. Johnston, Memphis, production and marketing division, National Cotton Council.

Thursday morning, July 29—Joe C. Hardin, Grady, president, Arkansas Farm Bureau Federation, presiding: panel discussion, "The Place of Irrigation in Cotton Production in the Rain Belt."

"Weather Facts," Albert L. King, in charge, U.S. Weather Bureau, Memphis office; "Physical Essentials," Ivan D. Wood, Denver, Extension SCS irrigation specialist; "Need for Research," John R. Carreker, Athens, Ga., agricultural engineer, division of soil management, humid regions, USDA; "Essential Services of Industry," Dan Howell, Memphis, Choctaw, Inc.

"Water Rights," Wells A. Hutchins, Berkeley, Calif., principal irrigation economist, production economics research branch, ARA, USDA; "Effects of Irrigation on Yield and Fiber Quality," W. P. Law, Jr., Clemson, associate agricultural engineer, South Carolina Experiment Station.

"Cost and Management Problems," John W. White, Fayetteville, associate director, Arkansas Agricultural Experiment Station; "Compatibility of Irrigation with Other Practices," James L. Gattis, Little Rock, agricultural engineer, Arkansas Agricultural Extension Service.

Thursday afternoon—Lippert S. Ellis, dean and director, University of Arkansas College of Agriculture, presiding:

"Needs and Opportunities for Credit in Adjusting Cotton Farms to Efficient Mechanized Units." "From the Farm Machinery Industry's Viewpoint," F. W. Jenks, Chicago, vice president, International Harvester Co.; "From a Banker's Viewpoint," W. F. Pierce, Dermott, Ark., executive vice president, Dermott State Bank.

"Challenges Ahead for Cotton Mechanization," Dr. C. R. Sayre, Scott, Miss., president, Delta and Pine Land Co. "The Farm Equipment Industry Accepts the Challenge," Bruce Lourie, Moline, Ill., vice president in charge of sales, Deere & Co.

Hamilton Moses, Little Rock, chairman, board of directors, Arkansas Power & Light Co., will deliver the principal address at a banquet Thursday night at the Hotel Marion. Dr. Louis E. Hawkins, Stillwater, director, Oklahoma Agricultural Experiment Station, will be toastmaster.

Friday morning, July 30—Tour of farming area in Little Rock vicinity, with luncheon at State Fish Hatchery.

Friday afternoon — Demonstration of modern cotton production machinery and techniques, Harold A. Young farm, under supervision of Kyle Engler, head, agricultural engineering department, University of Arkansas.

SOIL TREATMENTS

(*From Page 99*)

the sulfur-treated plots. A marked reduction in the number of sclerotia was obtained with M275 at both levels.

Exploratory trials were prepared in which chlorinated nitrobenzene was sprinkled into the open furrow and thoroughly mixed with the soil before planting whole, B size Cobbler seed pieces. Sulfur 500 lbs. per acre, applied in a similar manner, served as a control, since in previous seasons it had been effective in reducing scab. Thus, in the immediate vicinity of the seed piece and in the soil where tubers developed, actual concentrations of chemical were approximately three times greater than indicated. M275 was effective in reducing scab at all rates tested (Table 3), and control was outstanding at the 1000- and 2000-lb. rates. Russeting of tubers and *Rhizoctonia* sclerotia on tubers were reduced with all rates of M275 tested. Yields were increased significantly with 50 lbs. of M275 per acre, and even at 2000 lbs. per acre yields were not impaired.

A related chlorinated nitrobenzene, M1197, was ineffective in reducing deep scab, russet of tuber surface, and number of *Rhizoctonia* sclerotia on the tuber surface. At the high rate, 200 lbs. per acre, there was evidence of yield reduction.

A third related compound, M273, was highly phytotoxic and at rates of 20 lbs. per acre growth and stands were very poor. At higher rates potatoes did not survive.

To summarize: Pentachloronitrobenzene, M275, was very effective in reducing scab and *Rhizoctonia* on Cobbler potatoes in the peat soils of northern Iowa. In soils of this type, scab is a serious problem, and high rates of sulfur are required to effect control. In broadcast applications, 500 lbs. of 100% active pentachloronitrobenzene per acre gave very satisfactory control. Where the chemical was incorporated in the furrow, 200 lbs. per acre appeared to be effective for disease control.

Yields were increased significantly with 50 lbs. per acre in furrow application. The phytotoxic level of pentachloronitrobenzene was very low, as yields were not impaired by furrow applications of 200 lbs. per acre.

Two other related chlorinated nitrobenzenes were tested. M1197 was generally ineffective in furrow application for reducing scab, and it appeared to be relatively more phytotoxic than M275. M273 was very phytotoxic, and appeared to be of little potential value for potatoes.

Chase Plans Expansion

Expansion plans at Chase Bag Co.'s Minneapolis branch were announced last month by F. H. Luddington, president. More than $400,000 worth of multiwall bag-making and printing equipment will be installed in the branch in the near future, he stated.

ADAPTING HERBICIDES

(*From Page* 38)

be employed. With the extensive research and field testing now in force, we can predict with a great degree of accuracy what to expect from the chemical before it is marketed. Using our present knowledge, fully, as the basis for herbicide research and development, we can adapt herbicides for new uses much more rapidly. To do this it is necessary to help the farmer learn how to live with these chemicals, rather than how to live without them.★★

SYSTEMIC INSECTICIDES

(*From Page* 31)

scientists in fields other than entomology, a close cooperation between entomologists and research workers in other plant sciences is necessary for adequate comprehension of these new compounds.

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ENTOMOLOGY 100 YEARS

(*From Page 48*)

now enjoy, if parallel progress had not been made in the control of ticks, screw-worms, flies, lice, mosquitos and other pests.

It is difficult to state exactly when significant investigations in the control of livestock pests began in this country. Early entomologists such as Osborne and Howard began studying the taxonomy and life history of these pests before the end of the last century. Such basic information is vital to the development of control measures against insects affecting domestic animals.

Sixty-two years ago two veterinarians of the U. S. Department of Agriculture, Smith and Kilbourne, made the first outstanding contribution — the discovery that the cattle fever tick is the transmitting agent for cattle fever. This discovery, as subsequent events proved, was of vital concern to livestock producers of the nation, particularly in the South. Its importance goes far beyond this, however. This was the first concrete proof that an arthropod was a natural transmitting agent for a disease organism among animals. The finding stimulated further research to establish the role of insects, ticks, and mites in the transmission of many diseases of animals and man.

The result of Smith and Kilbourne's discovery was the eventual elimination of cattle fever in the South, a disease that killed thousands of cattle and made scrubby looking cattle out of millions more. The U.S. Department of Agriculture, in cooperation with state and county officials, succeeded not only in eliminating cattle fever but also in eradicating the cattle tick in the United States. This was achieved by enforced dipping of cattle and horses in arsenical dips, developed in 1906.

Although our worst livestock parasite problem was thus solved, many other pests are still taking their toll of animals and animal products.

The screw-worm fly is one of the most destructive livestock pests. It normally ranges only in southern areas, but in recent years, because of better facilities for rapid movement of livestock, the screw-worm has frequently become established in northern areas in the spring and caused havoc among livestock and game before the winter. In the early thirties it became established in the Southeast, where it can successfully overwinter in Florida. When it invades areas where stockmen are not familiar with proper livestock management practices and wound treatment procedures to reduce infestations, we get some idea of the destructive potential of the insect. The losses in deaths and weakened animals among cattle, sheep, swine, horses, and other livestock plus the cost of labor to protect the animals were terrific in the Southeast during 1933-1934, until an educational program for screw-worm control was initiated by the entomologists of the U. S. Department of Agriculture and the States affected. Profits in livestock production in the South, especially among range animals, would be greatly reduced if present control methods were not available. Benzol as the killer of screw-worms

in wounds and pine tar oil to prevent subsequent attack, smear 62, a combination worm killer and wound protectant, and EQ-335, the most recent remedy, contributed greatly to the control of this pest.

The horn fly, which became established in the United States about 1887, is of little consequence as a pest of cattle when present in small numbers. However, under favorable climatic conditions this insect will develop in such numbers that cattle literally become covered with swarms of flies.

Through the use of pyrethrum and thiocyanate sprays, developed largely by industry, dairymen for many years have been able to keep horn flies under reasonable control on dairy cows. Until 1944, however, no practical way to control the pest on range cattle was known. Range cattle were at the mercy of thousands of flies, which day after day tormented them and took their blood. We did not realize the true economic importance of the horn fly until DDT was shown to control the pest for several weeks following a single treatment. Investigators with the U.S. Department of Agriculture and several midwestern States, however, showed that beef cattle sprayed with DDT gained over a half-pound more per day than untreated cattle subjected to intense horn fly attack. Entomologists with the Illinois Experiment Station demonstrated that fly control increased the milk flow of dairy cows as much as 10 to 20 percent. These data show how much damage the flies can do to livestock and how profitable it is for the grower to control the pests. The development and widespread use of pyrethrum, thiocyanates, DDT, methoxychlor, toxaphene, TDE, and other fly sprays is probably saving the livestock industry from 25 to 50 millions of dollars each year.

Significant progress has also been made in improvement of methods of treating livestock with insecticides. High pressure sprayers have made it practicable to control cattle grubs on range cattle. In fact, sprays have replaced dips or washes in the control of most of the external parasites. A simple low-cost, self-treatment device developed by a South Dakota entomologist permits excellent control of the horn fly. Automatic sprayers developed by Illinois entomologists offer practical means of protecting range livestock from attack by blood-sucking flies, without the necessity of roundups to treat the animals.

Similar progress has been made in the control of other major livestock pests. The stockman who follows recommended practices today can reduce to a minimum the losses caused by ticks, horn flies, lice, sheep ticks, scab mites, mange mites, and poultry lice, mites, and ticks. He can greatly reduce losses caused by screw-worms, cattle grubs, stable flies, horse flies, and other pests. There is still much research to be done to provide effective and economical control measures for these and other pests. Moreover, we have no assurance that existing methods will be effective in the years ahead. The increasing list of pests that have developed resistance to currently used insecticides does not permit such an assurance.

Entomologists and associated workers — chemists, veterinarians, parasitologists, and animal husbandmen—with Federal, State, and industrial institutions can well claim a large share of the credit for our present successful livestock industry, which is a vital factor in the nation's high state of health and economic welfare.

I am confident that they will continue to improve livestock pest control methods through continued research, in spite of the advantage we give many of the parasites by creating conditions favorable to them such as increasing the livestock population, particularly in improved grassland areas. New methods of great potential value are under development, including the use of systemic insecticides and atomic radiations, new sprays and dips, and simplified techniques for their application.★★

(To Be Concluded)

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Tale Ends

THE Greenbrier vs. The Homestead. Those attending the two big national fertilizer association conventions last month had another opportunity to renew the old debate as to which of these two lovely, spacious and luxurious establishments they preferred —and each of course has its supporters, some highly vocal. The Greenbrier has its unsurpassed table, its Dorothy Draper decor, its commodious golf house, the "Old White," its choice of golf courses. But then the Homestead has its more homey atmosphere, the advantage that people are more readily found in the lobby, golf and tennis within a minute's walking distance of the hotel,— and finally the bats in the lobby, which come out in the later hours and wheel around the ceiling, providing a sort of unusual touch. In the final analysis, it's the C & O any way you look at it, and you just pays your money and takes your choice. Anyway, you pays your money.

AC

The high level of golf at these two meetings carried with it the atmosphere of Baltusrol . . . and the National Open . . . rather than the usual run-of-the-mill trade association convention, where a score in the low eighties might look very good. One afternoon at the Plant Food Council a rather good golfer got himself a 74—which would normally be right down there —only to find the best he had done was tie for third. Best score of the week was a 67 carded by Bob Linderman of IMC.

AC

This reporter at long last discovered the mountain-top airport which serves the Homestead. You climb about eight miles up in the air, and upon reaching the runway find that it has been pawed up rather roughly by mountain goats. Principal advantage is that once you take off, there is no further climbing to gain altitude required. It's all down hill from there to Roanoke.

AC

We have never quite figured out how the C & O operates its train service to White Sulphur. On the ride from New York to Washington there is no club car aboard the train—and by the time one is foresighted enough to order a drink from the dining car porter, it develops that we are now going through Pennsylvania where sale of liquors aboard a train is illegal. Then, after spending an hour and a half switching various sections of the train around the Washington station, getting off, seeing half the train pull out, finding it assembled once more on a track on the lower level, it finally moves out to the south, hitched this time to a very fancy and well-stocked club car. But right at the hour when everyone has finally decided to give up and turn in. Page Mr. Young!

AC

It was, as one NFA speaker observed, the first meeting he had ever attended held in a swimming pool — and a swimming pool at that equipped with overhead sprinklers. Even the McCarthy hearings might have been held in such a setting without danger of setting fire to anything other than tempers. And when, we might add, will the Greenbrier finally weaken and provide a new—and preferably an outdoor—swimming pool?

AC

Your reporter, after dodging the issue for more years than he can remember, finally weakened this trip and sampled the sulphur waters. And his only decision was that he hasn't missed anything by the long delay. There are two varieties of the waters—white and grey. The attendant advises that after a mild shot of the white brew, you should head for your room at a brisk pace. After the grey, however, he recommends that you set off at a gallop—and for the locker room of the golf house. You would never make the hotel, he counsels.

No. 1 of a series

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NSS4-13

ARKANSAS—Marvin McCalman grows cotton in the Red River bottoms near Bradley. "For the last several years," he reports, "I found toxaphene has been very effective in control of over-wintering weevils, fleahoppers, and thrips . . ."